THESIS

PROFILE OF HIGH ACHIEVER IN MATHEMATICAL LEARNING STRATEGIES FOR STUDENTS IN SMA NEGERI 1 BONE

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INTERNATIONAL MATHEMATICS EDUCATION PROGRAM

DEPARTMENT OF MATHEMATICS

FACULTY OF MATHEMATICS AND SCIENCE

STATE UNIVERSITY OF MAKASSAR

2017

THESIS

PROFILE OF HIGH ACHIEVER IN MATHEMATICAL LEARNING STRATEGIES FOR STUDENTS IN SMA NEGERI 1 BONE

Submitted to the Study Program of Mathematics, Faculty of Mathematics and Science, State University of Makassar in Partial Fulfillment of the Requirements for the Degree of Education Bachelor

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LEGALITY PAGE

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This thesis is submitted by Sella Arzyta AS, the student's ID 1311440022, entitled Profile of High Achiever in Mathematical Learning Strategies for Students in SMA Negeri 1 Bone, had been defended in front of the committee of examiners (**SK No. 2114/UN36.1/PP/2017, dated May 22nd, 2017**) and declared to be accepted as part of the requirements to obtain a Bachelor Degree of Education in Study Program of Mathematics Education, Department of Mathematics, Faculty of Mathematics and Science, State University of Makassar on Friday, June 2nd, 2017.

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MOTTO AND DEDICATION

Let everyone especially your friends deserve their happiness, it has been written on them. You will certainly get your own happiness afterward which must be in line with your efforts that you also fully deserve (Anonym).

Success didn't come instantly

but through the ethical struggle.

Do what you can

With what you have

The Author dedicates this paper to the top Loving Parents

that upbringing me tirelessly and always provide prayer

and support in every step is taken by the author.

ABSTRACT

Sella Arzyta AS, 2017. "Profile of High Achiever in Mathematical Learning Strategies for Students in SMA Negeri 1 Bone". **Thesis**. Department of Mathematics, Faculty of Mathematics and Science, State University of Makassar, (guided by Prof. Dr. Usman Mulbar, M.Pd. and Dr. H. Djadir, M.Pd.).

Abstract: This research was aim to obtain information about the profile of learning strategies in Mathematics of high achiever student. The method used was descriptive qualitative. This research conducted on students who have high achievement in mathematics and actively participate in the mathematics competition. Research subject were 2 students that consist students on grade X and XI. For data collection, the instrument used was field note and interview schedule. Every activity of students during the learning process in the class have been observed then continued by interview process to search clearly about the students owned strategies in mathematics. The results of the research showed that: (1) Elaboration strategy used by students to remember the learning material have learned and used them to solve the problems. (2) Critical thinking strategy used by students to select the learning materials which needed to solve the problems. (3) Monitoring strategy used by students to control their cognitive activities during the learning process. (4) Regulation strategy used by students to control their effort and attention if they felt confused when learning. (5) Time management and study environment strategy are used by students to manage their learning time and place so the learning process more effective and efficient. (6) Peer learning strategy used by students to conduct collaboration in helping their learning process. (7) Help seeking strategy used by students to address the difficulties in learning by asking their classmates, teachers, or people around them.

Key Words: Learning Strategies, Mathematics, and High Achieved Students

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Makassar, April 2017

The Author

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CHAPTER I

INTRODUCTION

A. Background

The quality human resources are the dream of all the States. It’s close to the quality of resources that be one of the important factors that participate to national development. As one of the countries that have the largest population, certainly an honor to Indonesia because of the abundant human resources. However, the abundant resources are no better than the quality of human resources (Tjalla, 2010). One effort to improve the quality of human resources is through education.

Education is a systematic process to enhance the potential of human resources. Basically, the aim of education contains three major aspects namely affective, cognitive and psychomotor. It’s appropriate to the statement of Berkowitz in Berkowitz and Bustamante (2013) states that "Education, in general, has three major goals: academic achievement and learning, character development, and civic socialization". Education attainment is strongly influenced by the quality of education that owned by a country. The low quality of education shows that the quality of human resources is low too so that achievement is unsatisfactory.

Achievement is one person's success that achieved after going through a process or an effort. When related to the term "learning", then the learning achievement is success achieved by someone after going through a process that

called learning. Learning by Slamento (Jamal, 2014) is someone’s effort to achieve a change in new overall behavior based on his own experience through interaction with the environment.

Learning by experience will form a person's behavior that distinguishes it from others. The term learning is also always understood as the ability to memorize or to mention the variety information they have read so some parents or teachers will happy and proud when their students are able to recall of the information contained in books or other learning resources (Syah, 2015). In fact, they do not necessarily understand the information that they convey. It is related to the intellectual abilities of every student.

The differences of intellectual ability influence the ability of students' understanding of the learning material. Most of the learning material that difficult to understand by students is a learning material related to mathematics. In fact, mathematics is needed by the society. The low student understanding of mathematics is also caused by the object of mathematics is abstract. The students will be better to understand a lesson if it can be observed directly, rather than simply thought or imagined. It is certainly difficult to apply in mathematics because there are mathematics learning materials that can not be concreted.

Mathematics instruction has been conducted since the basic education. It aims is to make the students able to understand mathematical concepts correctly so it can be associated with everyday events. If early the students have

understood mathematics concepts correctly then the difficult issues can be solved. However, it has not been achieved in mathematics education in Indonesia. Most of the students just memorize the formulas when they are learning mathematics so that they didn't understand the meaning of the mathematics learning material. Some students consider that learning mathematics is similar to learning other subjects which only require the ability to memorize or remember.

Although until now there is no the best solution to make the students like and understand mathematics, the useful of mathematics in everyday life is still required. The usefulness making mathematics as one of the disciplines that must be mastered by the students. One way that has been taken by the government to enhance the interest of students towards mathematics is providing mathematics competitions such as the National Science Olympiad (OSN). OSN Implementation aims to improve the ability of critical thinking, creativity, interests and talents, as well as achievement motivation, especially in mathematics. The implementation of OSN has shown the achievements of the students in their own country. The achievement is expected to motivate the other students to get achievement in their respective fields.

Learning achievement achieved by students is not only determined by their intellectual level. The learning achievement is influenced by various factors, including interests, talents, habits, learning strategies and etc. Many students who can't achieve the good score because they didn't know the effective ways or the learning strategies. Learning strategies are considered

important in determining the student achievement. Students with low intellectual abilities could have a good learning performance because they have a good learning strategy, though it can not be denied that the majority of student achievement is determined by their intellectual level.

The students with different intellectual level basically have the different learning strategies too. The intellectual differences which make students determine their own learning strategies to understand the difficult learning materials, such as mathematics. The abstract mathematical object forces the teachers and students' brain to work more and still understand the learning material.

The students' learning strategies are series of activities that they use to achieve their aims. Learning strategies are the patterns formed by the learning process they have been through before. Unwittingly, the students have their own learning strategies that distinguish them from the other students. Owned strategies are expected to help students achieve good learning performance because the achievement shows the ability of people in education.

The strategy to understand the learning material is an important thing that should be owned by every student. The strategy is expected to increase the number of students who excel in the school. The differences in the learning strategy are interesting to investigate, especially the learning strategies of high achiever students. Based on it, the researcher is interested in reviewing the " Profile of High Achiever in Mathematical Learning Strategies for Students in

SMA Negeri 1 Bone ". By knowing these learning strategies, the other students are expected to follow them or as a reference to create their own learning strategies so that they can improve their learning achievement.

B. Research Question

Based on the background above, the research question that formulated is “what is the profile of high achiever in mathematical learning strategies for students in SMA Negeri 1 Bone?”

C. Research Aim

The aim this research is to describe the profile of high achiever in mathematical learning strategies for students in SMA Negeri 1 Bone.

D. Research Benefits

The contributions of this research are:

1. Theoretical benefits

   This research is expected to provide the information and knowledge about the profile of learning strategies in Mathematics of high achiever students in SMA Negeri 1 Bone.

2. Practical benefits
   a. For parents, this research is expected to be information to know and help their children to improve their mathematics learning strategies.
   b. For schools, this research is expected to be the reference to determine the students' mathematics learning strategies especially for high achiever students in mathematics.

c. For Mathematics Department, this research is expected to be a reference for subsequent researchers who want to investigate the same topic.
d. For the university, this research is expected to be a reference to add to the treasury of scientific papers.

E. Term Limitation

To avoid the different interpretations of the terms used in this research, there are the following term limitations:

1. Learning strategies

   Learning strategies are series of learning activities that often done by students achieve their learning aim. Learning strategies which is focused on this research are learning strategies of high achiever students in Mathematics.

2. Profile

   A profile is a clear and complete description of the situation and condition of a people or certain things based on the learning strategies of subject which represent the facts that can be used for identification aims.

3. Students of high achiever

   They are the students who get high grade and prime in mathematics in the classroom and get the achievements in mathematics competitions, such as in district level, province, national, and international level. For example, their contribution in OSN or other mathematics competitions for all levels.

CHAPTER II

LITERATURE REVIEW

A. Learning Strategies

1. Strategies

The strategy is an outline designed to achieve predetermined objectives (Trianto, 2009). This is appropriate with the opinion of Griffiths (2004) which states that the strategy is being used to achieve the purpose of employment. If it is associated with an agency or organization, it can be said that a strategy is a common approach to the long term of an organization to maintain their life through sustainable competitiveness (Usman and Raharjo 2013).

In addition, the strategy is a plan, method, or series of activities designed to achieve specific objectives (Nawi, 2012). If related to the teaching and learning then the strategy is the effort of the teachers so the learning outcomes can be maximized such that the learning objectives that have been formulated can be achieved as efficient and effective (Sunhaji, 2008).

Therefore, can be summarized that the strategy is activity plan to achieve the predefined aims.

2. Learning

a. Learning definitions

"Learning is a cyclical process where the stages of gaining concrete experience, reflective observation, abstract

conceptualization and active experimentation can be well distinguished" (Toth, 2012).

Toth opinion above discusses the study as a step to gain real experience. That opinion is supported by Slamento's opinion (Jamal, 2014) which states that learning is an effort to achieve the change in whole behavior and be a new experience itself as a result of interaction with the environment. Learning as complex processes that occur in the brain (Zirbel, n.d.).

Zirbel's opinion appropriate with the following Slavin's opinion (Trianto, 2009):

> "Learning is usually defined as a change in an individual caused by experience. Changes caused by development (such as growing taller) are not instances of learning. Neither are characteristics of individuals that are present at birth (such as reflexes and response to hunger or pain). However, humans do so much learning from the day of their birth (and some say earlier) that learning and development are inseparably linked".

"Learning is the activity that is processing, and be a fundamental element in the implementation of every type and level of education" (Syah, 2015). Another side, Skinner (Syah, 2015) noted that learning is a process of progressive adaptation. The adaptation process directly related to one's personal (individual). Therefore, it is true if Syah (2015) states the definition of learning as a step of change relatively sedentary throughout the individual behavior which is the result of experience and environmental interactions involving cognitive processes.

Learning is all mental activities of people that cause a change in behavior which is different between before and after the study (Wahab, 2015). A process is said to learn if it satisfies the following key points: 1) learn to make a change, 2) the principal change is to obtain the new skills, 3) change occurs because of the effort (Suryabrata, 2013).

Therefore, learning is all activities which lead to making a change in the behavior of the individual.

b. Learning characteristics

Learning is a process that occurs in the individual that can be observed by another individual. Therefore, learning can be observed directly through traits caused. The learning characteristics by Haling (2007), namely: 1) a change in behavior as a result of learning, not a changes in behavior by maturity process, 2) changes in behavior as a result of learning, not a change in behavior by changes in physical conditions, 3) learning outcomes are still relative.

Haling's opinion appropriates with the opinion that expressed by Wahab (2015) which states the characteristics of learning include the following:

1) The change that occurs consciously

Individuals who learn would realize that there is a change, at least changes it applies to themselves.

2) The changes in functional learning

The changes is a continued change so that the changes will have an impact on the life or further study.

3) The changes in positive and active study

The changes are growing better than previously expected. Therefore, more and more effort into learning to do, the more changes are obtained. The active change in question is a change that does not happen by itself, but there is effort attempt to achieve it.

4) The changes in learning is not transient

The changes are not only be felt immediately like sweat and tears.

5) The changes which aimed and focused

The changes that occur because there is an aim to be achieved. The study directional changes occur when the change in the behavior of the actually realized.

6) The changes which didn’t appear

The changes can be illustrated as when a people learn to ride a bicycle then the change is evident if the child is able to ride a bicycle. However, there are other changes that happened.

3. Learning strategies

a. Definition of learning strategies

Kem (Wahab, 2015) stated that learning strategies are activities that must do by of teachers and students in order to achieve the learning objectives effectively and efficiently. Kem opinion appropriate with the opinion of Dick and Carey (Wahab, 2015), a learning strategy is a set of instructional learning materials and procedures are used together so that generate student learning outcomes.

Another side, Sanjaya (2006) noted that learning strategy is a series of activity plan including methods and utilization of various resources in learning to achieve certain aims. Another author that also found learning strategy is a series of activities is Wahab (2015) which stated that "learning strategy is a plan of action (set of activities) by using methods and utilization of various resources/strengths in learning".

Learning strategy is a description of a plan that contains the components and phases of learning learning materials that teachers do in learning activities to engage the students actively in learning activities to achieve the aims of the intended learning (Nawi, 2012). The strategy can be regarded as a plan that helps students in learning to achieve learning objectives (Mularsih, 2010).

Sanjaya (2006) defined that learning strategy as the way that used by teachers to choose learning activities that will be used during

the learning process by considering the circumstances, learning resources, needs, and characteristics of learners faced in order to achieve the learning objectives have been formulated. Based on Sanjaya opinion above, it can be said that learning strategies are learning the technique (way) that will be applied to students. It's appropriate with Slameto opinion (Sudarma and Nugraheni, 2005) that learning strategies are the best technique (ways) of learning by setting the time as efficiently as possible in order to obtain the maximum results.

Slameto's opinion above relevant to the Zare's opinion (2012) that "Learning strategies were seen as special ways of processing information that improve comprehension, learning, or retention of the information". Then Chiu, Chow, and Chang (2007) state that "Learning strategies refer to the mental processes which help learners understand new information".

Therefore, learning strategies are the plan of sustainable activities which is conducted by the student or group of people to achieve learning objectives.

b. The aim of learning strategies

Learning strategies are crucial taught to students to form student as the learners who have self-control (self-regulated learning) (Trianto, 2009). On the other side, Wahab (2015) stated that learning strategies that include the arrangement of the steps used to help make the right

decisions so that learning objectives can be achieved effectively and efficiently.

Sunhaji (2008) stated that two objectives of learning strategies, namely: 1) learning strategies related to the main objectives which already listed in Specific Learning Objectives (TPK), 2) learning strategies related to the companion objectives for students developed from learning atmosphere as they become more critical, democratic, social and so as a result of learning. In addition, Cheng, Wu, Gao, Zhu, and Liu (2013) stated that mastering of learning strategies would help the learning process as more interesting and efficient.

c. The types of learning strategies

Types of learning strategies that stated by Pintrich, Smith, Garcia, and McKeachie (1993) consist three general part, there are cognitive strategy, metacognitive strategy, and resource management strategy.

1) Cognitive strategies

Cognitive strategies include basic and complex strategy which done by students to process information obtained from the textbook and the teacher. Cognitive strategies are divided into:

a) Rehearsal

This cognitive strategies measures strategies to learn by repetition (Gasco, Villarroel, and Goni, 2013; Broadbent, Poon, 2015). The students hear or re-read the learning material which

given by the teacher to recall this information. This strategy is very nice to use in complete the easy task and recall the information in short-term memory, however, this strategy can't help the students to conduct internal connection between that information or integrates the information with previous knowledge.

b) Organizing

This strategy helps the students to choose the true information and conduct the connection between that information learned. Example, clustering the learning material, outlining, and determine the main idea in reading.

c) Elaboration

This strategy helps the students to save the information in long-term memory by conducts the internal connection between every part learned. This strategy relates to the student's ability to fuse new and existing information with the aim of remembering the new learning material (Richardson et all in Broadbent and Poon, 2015). For example summarizing, and making the analogy. This can help the students to integrate new information with the previous knowledge.

d) Critical thinking

Critical thinking relates to the ability to carefully examine learning material (Richardson et al in Broadbent and

Poon, 2015). This strategy shows the level of the application of previous knowledge with the new information with the aim of solving the problem, accept the decision, or make the evaluation.

2) Metacognitive strategies

Metacognitive strategies have been proved to improve learning achievement, they appear to be strong predictors of academic performance, and even the students with rather low learning ability could be trained to use them and achieve a better result (Saalik, 2015). This strategy relates to person ability to control their cognitive. The strategy includes:

a) Planning

Planning activities such as aim organizing and analyze of the task could complete the relevant aspects from prior knowledge such that easier to understand them.

b) Monitoring

Monitoring activities measure the knowledge of students and the ability to control their cognitive (Gasco, Villarroel, and Goni, 2013). The activities could help the students understanding of the learning material and integrate them with the prior knowledge.

c) Regulation

These activities relate to the ability to control the effort and attention versus distractions or to difficult task (Gasco, Villarroel, and Goni, 2013). This activity assumed could improve the learning achievement by helping the students to check out and correcting their behavior during the learning process.

3) Resource management strategies

Resource management strategies include time management and study environment, peer learning, and help seeking.

a) Time management and study environment

This strategy helps the students improve their academic productively. Time management entails the process of planning, implementing the plan, and self-evaluation with the aim of using time effectively. Study environment strategy involves regulation of students' study environment in a way the achievement of aim (Altun and Erden, 2013). The students who capable to manage time efficiently expected to have better academic achievement too.

b) Peer learning

This strategy may the students collaborate with the other student with the aim of helping the learning process. Collaborating with other students has been found to have

positive effects on learning achievement. This could help the students clarify the learning material and rich insights one may not attain one own (Pintrich, Smith, Garcia, and McKeachie, 1991).

c) Help seeking

This strategy involves the efforts of the individual to secure assistance from other. Help seeking is considered to be an important element of social learning (Altun and Erden, 2013). The assistance is given by their friends or teachers. Good students know about when they don't know something and capable of understanding someone who can give the assistance to them.

B. Learning Achievement

1. The definition of achievement

Achievement is a result that obtained by a people or group of people as a result of the changes they conducted (Kulap, Umar, and Supartin, 2013). Achievement is the result that achieved by someone after doing the tasks or certain activities (Sudarma and Nugraheni, 2005).In addition, the Spence and Helmreich (Singh, 2011) defines the achievement as the orientation behavior.

However, it can be concluded that achievement is the result of a process that conducted by someone based on previous orientation.

2. Learning achievement

Learning achievement is the level of success that achieved based on the activities or efforts to provide emotional satisfaction, where they can be measured by means of specific tests. Learning achievement is the level of humanity which each student in accepting, rejecting, and evaluate information that they acquired in learning activities (Hamdu and Agustina, 2011).

Thus, we can conclude that learning achievement is the success of learning that obtained by individuals as a result of the effort of learning that they conducted.

3. The Types of Learning Achievement

Wahab (2015) divides the types of learning achievement into three domains, namely: 1) Cognitive domain, 2) Affective domain, and 3) psychomotor domain.

4. The Factors that Influence The Learning Achievement

In general, Syah (2007) classified the factors that influence learning achievement into 3 parts:

a. Internal factors

Internal factors are factors relating to the physical or mental condition of the students. The following factors are classified as internal factors:

1) Physiological factors

Physiological factors are factors relating to the physical

condition so that a good physical state would be beneficial and provide good learning outcomes, and otherwise, if the physical condition is bad then the results of their study bad too.

2) Psychological factors

The psychological factor consists of the following several parts:

a) Intelligence, intelligence is related to Intelligence Quotient (IQ) for each person.
b) Focus, good focus will produce a good understanding anyway.
c) Interest, the interest can be a desire and a high tendency towards something.
d) Motivation, an internal condition of the individuals that will encourage them to do something.
e) Skill, a potential ability of each individual to achieve success in the future.

b. External factors

External factors are factors or environmental conditions around the students. The following are included in the external factors:

1) Social factors

Social factors are factors that consist of a family environment, school environment, and community circles.

2) Nonsocial factors

Nonsocial factors are factors relating to the physical

condition or appearance of the surrounding environment of students, such as the location of the family residence, the location of the school buildings, equipment and learning resources and etc.

c. Learning approach factors

Learning approach factors are the effort of learners that includes the strategies and methods that can be used by students in following learning activities.

5. Measuring Learning Achievement

Learning achievement needs to be measured or evaluated to determine the extent of the increase in students' learning ability compared to the previous achievement. There are two types of approaches that are often used to evaluate learning achievements are:

a) Norm-Referenced Assessment

Norm-Referenced Assessment is conducted by comparing the student achievement to their classmate's achievement. For example, a group of junior high school consisting of 10 peoples and earned value Islamic subjects each: 50, 45, 45, 40, 40, 40, 35, 35, 30, 25. The values are then converted into values with a range of 1-10 or 1-100. Based on these samples, obtained the highest score of 50 so that the student received grades of 10 or 100 while the students who received the lowest score (25) means the student has obtained a score of 5 or 50.

b) Criterion-Referenced Assessment

Criterion-Referenced Assessment is conducted by comparing

the achievement of a student with a variety of behavioral domains predetermined. The grade of students is not based on a comparison with the grade achieved their classmates but is determined by the level of mastery of the subject matter in accordance with the instructional objectives. For example, when a student score 75 can't be said to pass though the value is the highest value in its class (Wahab, 2015).

In this study, the types of measuring learning achievement which used is criterian-refrenced assessment because the scores of the students based on their answer given in mathematics examination in their classroom.

CHAPTER III

RESEARCH METHODS

A. Research Type

Based on the aim of the research was to describe or display the profile of learning strategies of high achiever students in mathematics, this research included in descriptive research by qualitative approach. The researcher tried to dig up much information then described in narrative form so that given an overview about the thing which observed.

B. Research Subject

This research conducted in SMA Negeri 1 Bone with the research subject were high achiever students in mathematics, teachers, classmates, and students' family.

Research subject determined based on snowball sampling method by consideration below:

1. The subjects satisfy high achiever students' criteria in mathematics.
2. Possibility factor in conducting the open interview with the interviewees.
3. Subject's ability to express their mind.
4. The number of research subject was one of every level (X and XI) because in this research emphasized on learning strategies of high achiever students in mathematics.

The scheme of taking research subject:

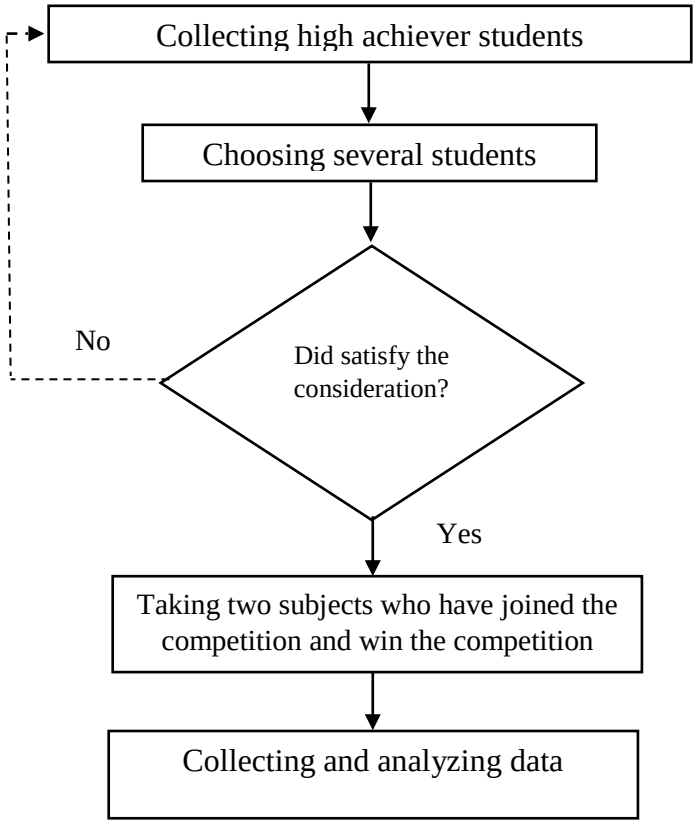

Figure 3.1 Taking Research Subject

C. Research Focus

The main focus of this research was to know about learning strategies in mathematics of high achiever students. The high achiever students refer to the students who have high grade in mathematics and usually joins the mathematics competitions and be the winner of the competition.

D. Research Instruments

Research instruments were:

1. Researcher as instrument

   The main research instrument in this research was an own researcher. Researcher directly collected the information and the data which needed in this research to identify the learning strategies of high achiever students in mathematics.

2. Field note

   Field note was used during the observation. This activity can be done when the students were attending in the learning process in the class. During the observation, the researcher write things related to condition occurred. Field notes could complete the information obtained from another source and helped the researcher analyzed the data obtained during the observation.

3. Interview schedules

   Interview schedules used are continues from one item of the questions to other items of the questions to search about learning strategies of high achiever students in mathematics. However, the items in this interview schedules can change and will evolve during the research because it dependents on interviewee's response in location. This interview helps the researcher to find out the open problem. There was the scheme of formulating learning schedules:

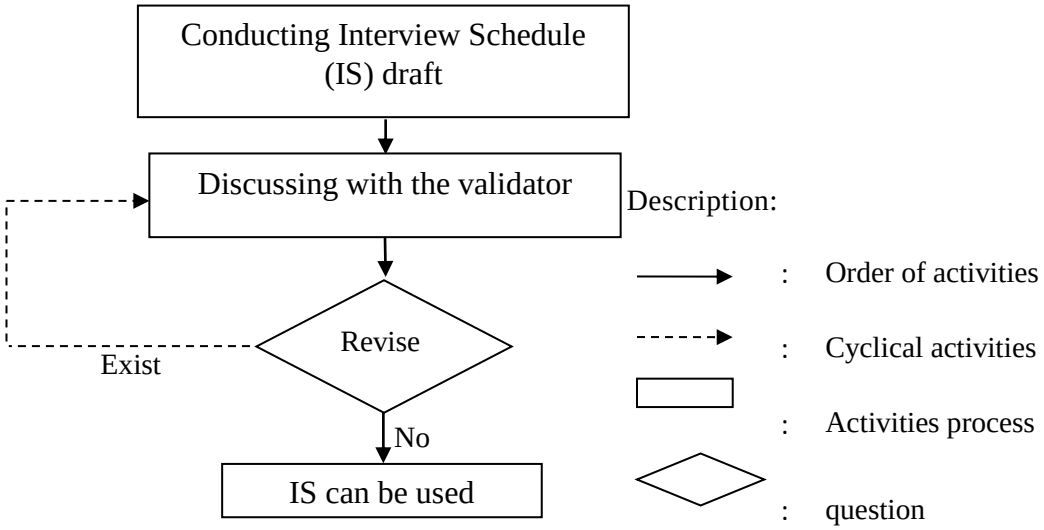

Figure 3.2 Steps in formulating Interview Schedule (IS)

Data Validity Test

This research involved instrument validity test and data validity test.

1. Instrument Validity Test

The instrument had been formulated then validated by two experts as a validator by the following table:

Table 3.1 Name of Expert Validator

Nu.	Name of Validator	Profession
1.	Dr. Ilham Minggi, M.Si.	Mathematics lecturer in UNM
2.	Nasrullah, S.Pd., M.Pd.	Mathematics lecturer in UNM

Then the result of instrument validation as follows:

a. Validator I

Several things which need to revise were clarified the questions every indicator, used language which simplifies to understand by students. In addition, noted every question may have same

interpretation with another question in the different indicator. Based on the validation result, interview schedule was decent used after revising some of the suggestion given first.

b. Validator II

Based on the aim aspects and the question items, interview schedule that have been formulated were decent used by the little revision. Some words in interview schedule needed to revise.

2. Triangulation

Triangulation aims to strengthen evidence from the different individuals. There are three triangulation i.e. technique triangulation (use the different techniques, for example, observation, interview, and questionnaire), time triangulation (data collected in the different time), and source triangulation (data collected from the different source, for example from teachers, students, and parents). Researcher checked every information and found the evidence to support the research indicators. The certainty that research will be accurate because the information describes many sources, the individual or process. Types of triangulation which used were source and technique triangulation.

E. Data Collecting Techniques

Data collecting techniques are important to obtain the desired data in the research. As the data collection techniques which used in this research were:

1. Documentation

Documentation in this case was collecting all the student's personal

documents, example the student’s grade and collection of achievement evidence especially those related to achievement in mathematics Olympiad. It aims to obtain the concrete and clear data and learning strategy in mathematics of high achiever students.

2. Observation

Observation used in this research was unstructured observation. The researcher noted the important things which related to the events that take place naturally in the class. The researcher noted about things had done by students related their learning strategies in the class.

3. Interview

Data obtained from the documentation and the observation will be combined when conducting interviews. Because there is the possibility that the unthinkable question in the writer's mind after reading the student’s documents and the results of the observation. The interview schedule that has been prepared before will accelerate the implementation of the interview even though the items in the interview questions may change depending on the situation, or the interviewees' answers.

As for who have been the interviewees in this research is the students as the subject of the research, family, classmates, and teachers. The interview clarified and improved the information that obtained later so that the interview is said to be as in-depth interviews (in-depth interview).

To improve the validity of data in this research, needed to test inspection (Moleong, 2002). The inspection test based on the criteria of of

credibility, transferability, dependability, and confirmability. In this research, to satisfy the validity of the data, researcher did the following:

a. Credibility

Moleong (2017) states that the credibility essentially replaces the position of the concept of internal validity in non-qualitative research. This criteria apply the inquiry so that the level of confidence of the invention can be achieved, demonstrating the degree of confidence of the findings through the evidence by the researcher on the double fact that is being investigated.

Credibility of the data have been done by regular observation, the researcher interviewed subject carefully and detailed continuously. Researcher has done triangulation to evaluate the data. Triangulation used were source triangulation i.e. interviewed the classmates, family, and teacher and technique triangulation namely observation and interview.

b. Transferability

Transferability differ from external validity in non-qualitative research which can be generalized to all contexts in the same population on the basis of findings obtained from representative samples (Moleong, 2017). It depends on the similarity between the sender and recipient context. Therefore, the researcher should conduct a small research to ensure the verification effort. The transferability conducted in this study was to describe in detail the students' learning strategies, whether they can be observed directly in the classroom or not.

c. Dependability

The dependability essentially replaces the term reliability in non-qualitative research indicated through replication of the study. The reliability of non-qualitative research can be achieved if the results obtained through the repetition of studies are in the same condition. However, it is very difficult to achieve in qualitative research because it relies on the research instrument and phenomena that really natural.

In addition, there are many factors that allow for errors during the study. Through some considerations, there is a dependability criteria that larger than reliability. It is based on a review in terms that a concept takes into consider everything, that is, on reliability itself added with other related factors (Moleong, 2017). Dependability test in this research is done by conducting an audit of the whole research process.

d. Confirmability

Moleong (2017) states that the criteria of confirmability comes from the concept of objectivity in non-qualitative research. The concept of objectivity on non-qualitative is defined from the agreement between the subjects. One's experience can be said as subjective while if agreed by some people then it can be said objectively. Thus, its objectivities-subjectivities depend on people.

Scriven (Moleong, 2017) states that there is still a quality element attached to the concept of objectivity that can be extracted from the definition that if something is objective then it can be trusted,

factual, and it can be ascertained. In this regard, subjectivity means unreliable or distorted. The last meaning that is used as the foundation of the transfer of understanding of objectivities-subjectivities becomes confirmability.

If non-qualitative emphasis on 'people' then natural or qualitative research emphasizes the 'data'. Thus the dependability is no longer on the people but to the data. The confirmability test in this research is done by digging the actual data and not changing the data.

F. Data Analysis

Data analysis in qualitative research conducted during the research process, since the start of data collecting until data collecting process was complete (Creswell, 2014). In this research, the data analysis conducted on the personal documents of the research subject and the results of the observation. Furthermore, the data analysis continued to the interview. In this step, if the researcher has not received a satisfactory answer from interviewees, the researchers continued the questions so that the data obtained are considered saturated. The data obtained then analyzed descriptively.

Data analysis techniques in qualitative research are different from data analysis techniques in quantitative research. Because the data that will be analyzed differently. Data analysis techniques are very diverse, not least in qualitative research. MY, AR, Yanti, Novianti, Wirawan, Wahyuddin, Mulia, Nurhasanah, Arnaelis, and Syahreni (2014) suggest that the diversity of qualitative data analysis techniques because of differences of expert qualitative

research. Additionally, the approach that used in the research also affect to the data analysis techniques will be used.

Nevertheless, the general techniques of data analysis is a data reduction, data display, and conclusion /data verification.

1. Data Reduction

   In this step, the researchers choosen and concerned to every data for the simplification data, abstraction and transformation of data obtained previously. There are groupings of data because not all of the data obtained will valid. However, invalid data is not removed because it will likely be used to verify the other data.

   In this step, data validation has also been started. Validation will be done after refining the analysis in categorizing data into each problem through a brief description, directing, and remove the data that is already not required such that it can be validated by verification.

2. Data Display

   Data display consists of classifying and identifying data. In this step, the data set that has been organized are displayed in the various forms, such as narratives, graphics, and more. This step is very important to achieve the valid data.

3. Generalization/ Verification

   The next step was conclusion of the research on the data that have been collected and verified before. The conclusion to be achieved on qualitative research is new findings. It could be a description of an object

that previously was not clear so that after investigation will make the description of the object more clear.

CHAPTER IV

RESEARCH RESULT AND DISCUSSION

A. Research Result

This research conducted on the even semester in academic year 2016/2017, specifically in February until March 2017 in SMA Negeri 1 Bone. Research subjects are students in grade X and XI, mathematics teachers, classmates, and student's family. Research object is students' learning strategies which have high achiever in mathematics. Instruments are field note and interview checklist.

The first, researcher observed mathematics instruction in grade XI which discussed probability. Observation has done for 3 weeks by following mathematics instruction in the class, such as compulsory and elective mathematics. Initially, all class XI MIPA observed to clarify subject's fulfillment. However, after 2 weeks observation, the researcher decided to continue the observation at class XI MIPA 2 because the subject is in that class.

After that, the researcher collected data from their classmates. Then, the researcher decided to discuss with the subject and the researcher obtained another subject. The subject is a student in class X MIPA. The researcher then met with him and discussed. Researcher met mathematics teachers who taught in class X and XI to get more information about mathematics schedules.

The observation about mathematics instruction has done in class X MIPA too. However, class observed just X MIPA 3 because subject criteria

have cleared from the information from his classmates and teacher who taught him, not only mathematics teacher. The next, researcher interviewed research subjects, that are students, teachers, classmates, and their family.

In interview step, the researcher asked about things which can't be explained during the observation process were conducting. The researcher asked too about the student's reason did those learning strategies. In addition, to interview the students and teachers, the researcher interviewed family and their classmate to validated data.

Research subject I is AS, a student of XI MIPA 2. The third child of four brothers was born at 21 November 1999. As a child, AS has liked mathematics. He always joins in mathematics competition start from in secondary school until now. From primary school until high school, AS always get the best score of mathematics in his class. AS always joins mathematics competitions which conducted by universities in Makassar and he usually joins in OSN.

In junior secondary level, AS got third place regional Bone in mathematics competition (Aritmatika UIN Alauddin) and being an emissary of Bone to continued competition in Makassar. In high school, AS with RG got a Fourth place of mathematics competition (Prisma Unismuh) Bone and continued the competition in Makassar. Recently, AS got a Fourth place in Bone on *Mathematics Event* (ME) Unhas.

Table 4.1 Score of Compulsory and Elective Mathematics XI MIPA 2

XI MIPA 2					
Name of students	**C**	**E**	**Name of students**	**C**	**E**
A. Muh. Abbas	97	95	A. Muh. Abbas	97	95
Nurhikmah Harun	97	95	Nurhikmah Harun	97	95
Ahmad Zulfikar	95	94	Ahmad Zulfikar	95	94
Muh. Fajri Hidayat	95	93	Alexander Leonardo	95	93

Description:

C : Compulsory mathematics

E : Elective mathematics

Research subject II is RG, a student of class X MIPA 3. RG is as a child has liked mathematics and as from primary school until now, RG often have contributed in mathematics competition. In primary school, RG has engaged mathematics OSN and got the fifth place. At the time, RG didn't have good preparation because he had that information one day before the competition.

In junior secondary level at VII, RG has engaged mathematics literacy competition was conducted in UNM. In addition, RG engaged selection of mathematics OSN and passed to the next step, OSP (being an emissary of Bone in mathematics OSN province). In grade VIII, RG got a third place in regional Bone on ME Unhas competition and passed until semifinal step. Grade IX, RG being the fifth place in regional Bone on ME Unhas and being Top 20 in Makassar. Recently, AS with RG got a Fourth place in mathematics competition (Prisma Unismuh) as well as included in Top 20 ME Unhas 2017.

Table 4.2 Score of Compulsory and Elective Mathematics X MIPA 3

X MIPA 3					
Name of students	**C**	**E**	**Name of students**	**C**	**E**
Rivaldo Go	94	95	Rivaldo Go	93	96
Muh. Thorieq	84	90	Muh. Thorieq	87	85
Erna Sri A.	83	90	Muhammad Fardiaz	85	78
Mutiara Praumaina	83	93	Dewi Febriyanti	84	87

Description:

C : Compulsory mathematics

E : Elective mathematics

Here is researcher explained the observation result which obtained during the learning process and research subject interview.

1. Cognitive Strategies

a. Rehearsal Strategy

1. AS Subject

a) Data Display

Data which obtained from observation show that AS seems like notes and writing at the papers when learning mathematics. AS only notes the important learning material which given by his teacher during the learning process. This is corresponding to the following interview transcript:

P-2	P	I mean that if there is some important matter which taught by teacher in the classroom, did you write it or not?
AS-2	R	Oh yes, just the important thing i wrote cause i usually lazy to write it, honestly. But, if there is very important, i remember it on my brain.

P-44	P	Did AS write note when learning at home?
KAS-44	R	Yes, sometimes when he completes his exercises. He has many books, not only book from his school.
P-45	P	Hm he always do his exercises at home, don't he?
KAS-45	R	Ya.

P-1	P	When learning mathematics in the classroom, did he write the matters? Write in his book during the teacher taught?
TAS-1	R	AS usually write the important matter in his book, if he already know it, sometimes he didn't write it.

Furthermore, the result of the conversation with AS subject, we obtained that AS rarely notes the learning materials, formulas, and solution of the problem at the book even rarely read those note. This is because AS tried to understand the formula row by row, try to proof them, and understand the problem when it's solving in the class such that he didn't need to note it. The conversation below shows the corresponding data above:

P-3	P	Eh have you reread that note?
AS-3	R	Yes, i have... I just remember how my writing, don't read it. What i have written without open that book.

P-7	P	I mean, in mathemathics, there are many formulas and definitions, right? Ee how do you learn the formulas?
AS-7	R	Oh if i learn the formula, i read row by row. One new formula. If i understand it, i'm looking for another formula which has relation to previous formula. So, i understand how the formula translated to another formula. But sometimes there is the formula which difficult to understand its concept.

P-11	P	How do you memorize it? Or how to know that formula? What's the way?
AS-11	R	My method is when the teacher explained in the classroom I directly understand then didn't memorize it. If I understand when the teacher explains, it's difficult to forget it, aumatically. But, if I don't understand when the teacher explains the formula, I forgot it.
P-48	P	He came home when afternoon? For example, have you entered in his room to see if there are patches on the wall like the formula?
KAS-48	R	No, just on a piece of paper. His books are in one folder. He collects all in one folder, if patches ... no.
TAS-3	R	If for example the formula, he understands because let the formula ever studied he still knows. There is indeed his memory of mathematical formulas. [*laugh*]. Otherwise, I do not know.
P-4	P	Have you seen he was repeating the way to solve the problem? Like resolve that those problem?
TAS-4	R	If he solves the problem, he usually do it once, but detailed. Sometimes he also resolve if he thinks it's not complete.

b) Data Interpretation

Data which obtained by observation and interview can be interpreted that AS didn't use rehearsal strategy when learning mathematics. This is caused by:

1) AS rarely notes the learning material which given by his teacher. AS usually notes the important things only.
2) AS rarely read his note.
3) AS understand the formula when taught in the class even he prove it such that he remember formula without memorizing.
4) AS solve the problems ones and only resolve when needs to completed.

c) Conclusion

The results can be concluded that AS didn't use rehearsal strategy because the learning materials have been understood in the class during learning process such that he didn't need to use this strategy.

2. RG Subject

a) Data Display

The following interview transcript of RG subject:

P-2	P	Why do you rarely take notes?
RG-2	R	Because ... I think it's better if I understand it in the school than I go home without got anything.
P-3	P	Do you often read the material or your note in the classroom?
RG-3	R	That note, sometimes I read in the classroom when I remember the material then there is a forgotten material, so I repeat it again.

The conversation above provided that RG rarely make notes about the learning materials which taught by the teacher because he is more focus when the learning materials taught and RG rarely read his note. The following conversation relevant to the following interview transcript:

P-36	P	What does he usually notes when learning mathematics? Does he often take notes?
TRG-36	R	For him, during learning mathematics, he never take notes, except when the teacer told him.

In addition, when studying at school and at home, RG studied and solved the problems. RG didn't note and memorize the formulas,

but understood that formulas such that there is easy to remember. This data is relevant to the following conversation:

P-8	P	I there any strategy to remeber that formula?
RG-8	R	Yes, my strategy first understands the formula ... the formation. Well it's automatically remembered.
P-9	P	Ee do you repeat the tasks or resolve the problems ever done?
RG-9	R	Eee yes if it's the standard problem ehh no.. but it's Olympic standard or something difficult like that... yes sometimes.

P-43	P	Does he memorize the formula or what's his way?
TRG-43	R	I did't think so, he just understood them.
P-44	P	Have you seen him resolve the problem?
TRG-44	R	Often.

P-5	P	For example when he learns mathematics at home, have you ever seen him solve the problem?
KRG-5	R	Yes.

b) Data Interpretation

Data which obtained by the interview can be interpreted that RG didn't use rehearsal strategy when learning mathematics. This is caused by:

1) RG rarely notes the learning materials and read them.
2) RG understand the process of formulating the formula such that he remember the formula, not memorizing.
3) RG sometimes resolve the problem which related to Olympics' problems.

c) Conclusion

The conclusion presented that RG didn't use rehearsal strategy because he has understood the learning material when taught in the learning process such that he didn't need this strategy.

b. Organizing Strategy

1) AS Subject

a) Data Display

AS rarely makes the learning material's points or underline the learning materials that will be learn. This data is relevant to the conversation below:

P-23	P	Ya, the next question, have you ever made the material points that will be learned?
AS-23	R	The material points?
P-24	P	Yes.
AS-24	R	Ya, i have.
P-28	P	So, you made the points for the next lesson?
AS-28	R	No, depend on the situation. Sometimes i make, but sometimes not. Depends on the condition.
P-30	P	Do you always underline or mark the matters you are studying? Such as in a youbook or in a guide book?
AS-30	R	No mark.
P-51	P	If he learns at home, have you ever seen him make outlines or points in his book?
KAS-51	R	Hm I haven't because I do not really understand mathematics so if there is a sheet of paper, maybe a matter of which he separated with another matter. He did not make points...
P-9	P	Hm have you seen he marks or underlines the matter he read in a book or something?
TAS-9	R	Yes.
P-10	P	Often? Or always?
TAS-10	R	Sometimes.

Besides rarely to take notes and underline the learning materials, AS rarely use the tables, diagram, or curves when learning. The data is relevant to the conversation below:

P-34	P	Have you ever made such diagrams, tables or others to understand a particular topic? Sometimes there is the matter especially such an probability that we can use certain tables to help the us. What diagram or matter for example diagrams, tables ...
AS-34	R	Most diagrams in statistics
P-35	P	Do you use the diagram?
AS-35	R	Yes.
P-36	P	About the table? For example the table in Probability.
AS-36	R	No, i don't.

P-53	P	Does he often make diagrams or tables when solving mathematics?
KAS-53	R	Diagram or table? Hmm I also do not know. I rarely open his book. Because he is angry when his book is opened.

P-13	P	Have you ever seen he make a kind of table, diagram, or something like that while learning?
AS-13	R	When learning together with others, he rarely makes tables, just like the numbers he wrote. But he once made tables, diagrams, curves and so on.

AS subject has made the list of formulas to help him learn the materials. The conversation below is corresponding to the above data:

P-38	P	Still got there. Do you make a list of formulas for the matter being learned?
AS-38	R	Not really.
P-39	P	Hmm for example if my sister made her own table and she wrote all the formulas, the lists. Do not you use that?
AS-39	R	I used to be so, but now it's different again.
P-40	P	Hmmm only when junior high school?
AS-40	R	Yes.

P-55	P	Hm have you ever seen him have a list of formulas?
KAS-55	R	Yes.

P-15	P	Has AS ever made a list of formulas when studying?
TAS-15	R	Yes, a list of formulas about the material being learned. Like regular notes.

b) Data Interpretation

Data which obtained by interview shows that AS isn't consistent in using organizing strategy when learning mathematics. This is caused by:

1) AS rarely makes the learning materials' points being learned.
2) AS rarely underline or sign the learning materials being learned.
3) AS has made the diagram, table, curve and others such that easier to understand.
4) AS has made the list of formulas in mathematics.

c) Conclusion

As seen in the previous conversations, it can be concluded that AS isn't consistent in using organizing strategy. This is caused AS always remember the learning materials have been learned and the learning materials will be learned such that AS rarely underlines his reference book. AS understand the formula such that he always remember it without make list of formula.

2) RG Subject

a) Data Display

The following interview transcript of RG subject:

P-15	P	Okay then do you make the outlines or the points of the material have been learned?
RG-15	R	Eee sometimes.
P-16	P	Sometimes? Then do you usually make the point in your book?
RG-16	R	Yes.

P-17	P	Do you always underline or mark the material?
RG-17	R	No, I don't.
P-18	P	No? So how do you know if this is the material you are learning?
RG-18	R	Ee just memory.

As seen in conversation above, it can be provided that sometimes RG makes the points of the learning materials being learned. RG only remember the learning material such that he didn't underline or sign that learning materials. This is relevant to the following interview transcript:

P-9	P	Does he usually underline his book? If for example he marks if you want to learn?
KRG-9	R	Yeah I think so, but he does not always do it because he already knows what he learned when he learning…

P-49	P	Have you ever seen he notes on the material points you want to learn?
TRG-49	R	Often,
P-50	P	Like what?
TRG-50	R	Just the material points.
P-51	P	Do RG is commonly seen marking or underlining the matter read in a package book or something like that?
TRG-51	R	Ordinary he underlined and he also circled.

To solve the certain problem, RG rarely uses the tables, diagram etc because RG more understands if solve the problem directly. Even RG never make the list of formulas or definitions about the learning materials. The conversation above is corresponding to the following conversation:

P-22	P	For example when learning mathematics, do you use the table?
RG-22	R	Yes, but sometimes i don't conduct the table
P-23	P	For example in Probability we use the table, right?

RG-23	R	Yes, but I wrote directly.
P-24	P	Do you make a list of formulas or definitions on the topic being learned?
RG-24	R	No, I don't.

P-12	P	Have you ever seen him make tables, diagrams or something if he learn?
KRG-12	R	If there's a task from school, he complete it... look that way. But, sometimes he read ... learn from the book. Ya sometimes he also learn from this ...Handphone.

P-53	P	Have you ever seen him make a kind of table, diagram, curve or the like while studying?
TRG-53	R	Rarely.
P-54	P	But ever?
TRG-54	R	Ever maybe, but still i don't know also if ever.
P-55	P	Have you ever seen him make a list of formulas about the material being learned?
TRG-55	R	Never. But maybe he ever made a list formula.

b) Data Interpretation

The data above indicates that RG isn't consistent in using organizing strategy when learning mathematics. This is caused by:

(1) RG rarely makes the points of the learning material being learned, however for other subjects, RG usually makes the learning material's point.

(2) RG rarely underlines or signs the learning material being learned.

(3) RG rarely use diagram or table when learning.

(4) RG never makes the list of formulas.

c) Conclusion

The results presented that RG didn't use organizing strategy. This is caused RG usually remember the learning materials have been

learned and the learning materials will be learned such that RG always remember formula without have to make the list of formula.

c. Elaboration Strategy

1) AS Subject

a) Data Display

See the conversation below:

P-42	P	Okay then, have you ever used math to solve on outside problems for example? There are problems encountered outside ...
AS-42	R	Ordinary as there could be associated mathematical concepts with the conditions that exist outside. For example in everyday life for example ... often often.

As seen in the conversation above, AS uses mathematics to solve the daily problems. This statement is relevant to the following transcript:

P-56	P	Have AS use mathematics in everyday life for example solving the problem?
KAS-56	R	Yes, sometimes if everyday there are also my cousin in elementary school, sometimes he taught. As he learned... ordinary he might repeat his previous lesson.
P-19	P	Has he ever integrated certain matter with other matter ever learned to solve the problem? Or like used to solve the problem of other subjects?
TAS-19	R	There is a question told to make a sentence but the way of making similar mathematical concepts. Yes we used mathematics to solve on other subjects such as physics.

Sometimes AS uses the previous materials to simplify him to find the solution. AS integrates the learning materials being learned to the previous materials to solve that problem. This statements is corresponding to conversation below:

P-47	P	Mathematics? Hmm can you integrate new material with the material you've learned when learning mathematics especially if you want to solve it out? For example there are currently learning probability, it turns out when the solve a probability, requires the previous material. Ever been?
AS-47	R	Yes I can
P-48	P	Ever?
AS-48	R	Therefore the probability as there is an example is related with the combination material.

TAS-19	R	There is a question told to make a sentence but the way of making similar mathematical concepts. Yes we used mathematics to solve on other subjects such as physics.
P-20	P	Ohh have he ever integrate some matters to solve the problem?
TAS-20	R	What's that problem?
P-21	P	Mathematics.
TAS-21	R	Yes, he have.

In addition, AS uses many references when learning mathematics. AS uses many references to solve a certain problem and sometimes make the summary and use his own word to understand the mathematics formulas and definitions that obtained from the references. This data is relevant to the following interview transcript:

P-52	P	Do you use your own language especially when there is a given formula or definition that may be hard to say?
AS-52	R	Iye. Sometimes .. especially if I lazy to memorize so I understand that concept. So, I made my own sentence

P-58	P	Suppose you get a reference from a book, how do you add a reference, add the formulas. Is it using one book or using another source?
AS-58	R	It's a book that very few examples and then explanations. So I look for another reference that is easier.
P-59	P	So what reference is used when learning?
AS-59	R	If usually the best I understand that in the book.

P-60	P	In the book? Only in your book you take reference?
AS-60	R	Sometimes from the internet.
P-61	P	From the Internet? What else? So if for example there is a formula from the teacher .... just ...
AS-61	R	[*Cut off the conversation*] so if there is a formula from the teacher I see again in my book. Which one is better.
P-62	P	Here use my package/guide book?
AS-62	R	Yes.

P-70	P	Hmm parabola. Do you make a summary of the concepts (matters) that teachers typically teach in the classroom?
AS-70	R	Summary? Yes. Usual.
P-71	P	In one lesson, the teacher has a learning aim.
AS-71	R	Yes sometimes, sometimes not. Somewhat busy, then there is another think it must be set aside again.

P-57	P	So, does AS usually collects formulas not just from 1 book?
KAS-57	R	Yeah, not only from 1 book I mean not only from the textbook ... from another book. Sometimes from my past books, he took it.
P-58	P	Hmm have you seen him make such matter summaries?
KAS-58	R	No, that's just a mathematics book as a reference ... a lot. He has many books.

P-16	P	Usually where does he get the formula?
TAS-16	R	In the textbook book that is shared and also according to his understanding. Or there are other references. But, more often that in the book or from the teacher therefore the dominant learned the formulas.
P-17	P	From which references other than books?
TAS-17	R	Usually on the internet if less than reference books.

P-22	P	Has he ever explained a mathematical formula or definition using his own word?
TAS-22	R	Usually he uses the formula according to his understanding, I do not if the combination of the formula.
P-23	P	Do you understand that his words? Do you understand?

TAS-23	R	Iye because it is simple according to our understanding. If I am well I understand that.
P-24	P	Does AS usually make summaries, such as material summaries or what have been learned?
TAS-24	R	If such a summary I do not know ever or never. But if notes, I used to see.

P-22	P	Do you also know the things that ordinary AS do, both NM and AZ in learning mathematics?
GAS-22	R	Yes. Preparation is also common to find other reference books if no books are found.

In the discussion, AS uses the learning materials being learned to help him because most of the discussion which conducted discuss the certain learning materials and the problems which relate to that learning materials. This data is corresponding to the following interview transcript:

P-75	P	Always? Do you use the learned material to help with the discussion?
AS-75	R	Yes, material discussion.
P-76	P	Hmm for example in the material what is commonly discussed?
AS-76	R	In the class ... the most frequent discussion when was the class X about what ee was about finding distance using comparison. For example the distance or height of the tree.....

The conversation above is relevant to the following field note:

3) *Elaboration* (Elaborasi)	3.1 Connecting mathematics materials with other materials 3.2 Integrate new material with previous material 3.3 Collect formulas from various sources (teachers, books, etc.) 3.4 Creating a concept summary from the teacher	*While solving on a task, the AS uses another formula to solve the problem given even though the formula already*

	3.5 Try to understand the material by connecting the material reading and teacher's explanation 3.6 Applying the ideas/ material which read in the class for example in the discussion and solving problem.	*provided in the package book.* *AS actively discussed during group work.*

b) Data Interpretation

Data obtained from observation and the interview can be interpreted that AS uses elaboration strategy when learning mathematics. This is caused by:

(1) AS uses mathematics to solve other problems.

(2) AS could integrate one mathematics learning material to other learning material to solve the problem.

(3) AS often uses his own word to understand the definitions or certain formula.

(4) AS uses many references when learning mathematics.

(5) AS uses the learning materials have been learned to help discussion and help him to solve the problems.

(6) Sometimes AS makes the summary to help him relates the learning material read and explanation from his teacher.

c) Conclusion

The results of data concluded that AS uses elaboration strategy well.

2) RG Subject

a) Data Display

P-26	P	Next do you ever use math to solve other problems?
RG-26	R	Often.
P-27	P	Often? Like what?
RG-27	R	Eee for example when we measure something in trigonometry then when we use permutations and combinations in determining the number of ways. Then that I often use it ... on calculations such as sequencing for ehh functions such as functions to determine the price amount of an item or determine profits if known capital and so on.
P-28	P	If for example when do you use it in everyday life?
RG-28	R	If everyday life h ...
P-29	P	That ever happened to you anyway
RG-29	R	Eee if everyday life ... sometimes ... often but not realized.

The conversation above shows that RG uses mathematics to solve several problems, even the daily problems which not realized. This statements is corresponding to the conversation below:

P-60	P	Have you ever seen him like combining certain material with other material ever studied for solving the problem?
TRG-60	R	Yes, ever.
P-61	P	What kind of the material was ever combined?
TRG-61	R	Like Economic lesson.

When learning mathematics, RG often integrates the learning materials being learned to the previous learning materials to solve the problems. This is relevant to the following interview transcript:

P-31	P	Furthermore, are you able to integrate or incorporate new material with previous material when it may be needed to solve the problem?
RG-31	R	Yes.
P-32	P	For example if ever combine, what materials are commonly used?

RG-32	R	What I combine is for example between pythagoras and trigonometric rules ... trigonometric identities.
P-33	P	What problems are usually solved with that merger?
RG-33	R	If the problem is still concrete I have never finished like that. But if for the problems that are in school or the olympics problem is often used.

Furthermore, RG uses many references when learning includes guide books and Olympics book. Sometimes RG uses his own word to understand the definitions and the learning materials obtained from the books such that easier to understand. The statements above is relevant to the conversation below:

P-34	P	Do you translate your own formulas or definitions found in the book?
RG-34	R	Yes.
P-35	P	What is your actual purpose to translate that yourself?
RG-35	R	I think when we translate that formula ourselves, we interpret the formula then we will get an interpretation or understanding that suits our mindset. Because each person has a different mindset.

P-38	P	Ee do you collect formulas from various sources, whether from a book?
RG-38	R	Yes.
P-39	P	For example from what kind of source?
RG-39	R	Eee internet, book yaa only from these both.
P-40	P	Internet, books?
RG-40	R	Yes.

P-13	P	Hmm from the mobile phone, indeed he often open his phone, right.
KRG-13	R	Yes. If there might be another guide, beside from school ... he bought it too
P-14	P	He also bought another guidebook.
KRG-14	R	Yes. So not only from his school. Anyway if there are other mathematics' books seen in the bookstore or in online store, he bought them.
P-15	P	So, a lot of books are in order to gather the formulas of various sources, right?
KRG-15	R	Yes, he does not stick to 1 book.

P-57	P	Never seen yeah. Is there any reference to his study besides the guide book from school?
TRG-57	R	Many sources.
P-58	P	Where did that come from?
TRG-58	R	He once brought a special book to prepare for OSN.
P-59	P	Ordinary have he opened the material also on the internet?
TRG-59	R	Always look for material on the internet.

P-62	P	Has he ever explained his definition or material in his own words?
TRG-62	R	Yes, use his own words.
P-63	P	Do you understsnd his words? That is if we read or he explained, can you understand?
TRG-63	R	It easy to understand.

When learning mathematics, RG always focuses on his teacher when explaining the learning materials. Besides that, RG actives in the discussion and in a learning group. As seen in the data above, the following conversation is discussed same things too:

P-46	P	So, how do you understand the material which read and the explanations given by the teacher?
RG-46	R	Eee the way is focus and then see the example of the problem. Then we analyze, understand why the solution is like that.
P-47	P	For example when discussion, do you use the material learned to help with the discussion?
RG-47	R	Eee yes.
P-48	P	Have you ever discuss the mathematics material in the class?
RG-48	R	Yes.

P-65	P	How does he think about the material he read?
TRG-65	R	He just read until he understand.
P-66	P	How does he understand the explanation from the teacher?
TRG-66	R	Listen and ask the teacher.

The result of the interview is relevant to the field note below:

3) *Elaboration* (Elaborasi)	3.1 Connecting mathematical materials with other materials 3.2 Integrate new material with previous material 3.3 Spell out for yourself the formulas, materials, or definitions 3.4 Linking / analogy of problem solving by other means obtained 3.5 Collect formulas from various sources (teachers, books, etc.)	*RG is active in discussion activities and he does not face significant obstacles.* *RG has many textbooks especially related to the Olympics.*

b) Data Interpretation

Data which obtained by the observation and interview can be interpreted that RG uses elaboration strategy well. This is caused by:

(1) RG uses mathematics to solve other problems.

(2) RG could integrates one mathematics learning material to another mathematics learning material to solve a certain problem.

(3) RG often uses his own word to easier understand definitions and formulas.

(4) RG uses many references when learning.

(5) RG uses the learning materials have been learned to help discussion and help him to solve the problems.

c) Conclusion

The obtained data shows that RG uses elaboration strategy well.

d. Critical Thinking

1) AS Subject

a) Data Display

When learning or solving the mathematics problems, AS often asks himself. Even AS often makes his own summary when found the learning materials from some references so that easier to understand. This is relevant to the following observation:

4) *Critical Thinking* (Berpikir kritis)	4.1 Often ask yourself what is being read / heard 4.2 Try to conclude or interpret the reading material especially when there are different formulas / theories from different sources 4.3 Trying to solve more difficult problems using the material / theory learned 4.4 Make / think about alternative solutions	*While solving the tasks, AS sometimes seems to think for themselves. AS only do the problem given by the teacher because the teacher given the time limit of group work.*

Even supported by the following interview transcript:

P-83	P	Ee do you often ask yourself about what to read or hear?
AS-83	R	Yes, often.
P-84	P	For example?
AS-84	R	If for example … get for example a difficult problem I keep asking how to solve it .. how to solve this problem. So, the more I ask myself, my curiosity is incease and sense of the level of craft is increase. So, I'm looking for that settlement in a book or other reference. That's what's interesting. If it's not interesting, I'm going to be lazy.

P-90	P	Hmm. Have you ever concluded reading material especially when getting various formulas from various sources?
AS-90	R	Ordinary.
P-91	P	There are formulas from his book, from the internet. There is the difference from the books and the internet but just the same meaning.
AS-91	R	Oh yes. Because there are more complicated as in the internet and the book more easily. Then I concluded that the internet is just translate it.

P-61	P	Hmm does he usually make his own conclusions?
KAS-61	R	Yes.

P-27	P	Like he said "*why is this*" or "*how do I work this out*". Something like that.
TAS-27	R	Yes, he is serious. He said about how to solve the problem. But not whispered too.
P-28	P	Well that's what I mean.
TAS-28	R	Yes ever but just like asking.
P-29	P	Has he ever been summarizing what material he learned?
TAS-29	R	Yes.
P-30	P	What ever he learned for example the material from the different sources, does he usually conclude himself?
TAS-30	R	Yes, he takes his own conclusions, but just the concept, he chooses which one he understands. Like I know all. [Laughs] This is just from I see yah, and my experience there must be something wrong from my statement.

AS looks for the references related to that problem and sometimes relearn that learning materials when faced the difficult problems. Even, AS often his own way to solve the problems especially if that problem can be solved by trial and error. The data is is relevant to the conversation below:

AS-95	R	For more difficult problems, I first look for references related to them. I understand how to solve them. I tried.
P-96	P	Have you ever tried that difficult material by reread the previous material?
AS-96	R	I have tried but sometimes .. sometimes difficult to understand.
P-100	P	Have you ever made or thought of other ways to solve the problem?
AS-100	R	Yes sometimes there is one problem that have many ways to solve it. There are simple and there is a need for translation. For example in composition or inverse what is in.Yes in inverse. For example *f(x)* wants to find the inverse there is a direct $\frac{ax+b}{cx+d}$ right if you want to search the invers directly turned into $\frac{dx+b}{bx-a}$.
P-102	P	Already? It is common that often taught the teacher there is a certain way, do you use this way... do you have another way?
AS-102	R	My own way? [Think] ohh ever. Like in ... especially if it has the small numbers then I use trial and error.
P-64	P	But did he learn mathematics or another task?
KAS-64	R	For now he focuses on mathematics because on 14th this month, he will join the Olympics.
P-78	P	If he is, how can he solve for example if there is a difficult problem?
KAS-78	R	If it is a difficult problem? I do not know maybe he gathered his book he had learned or not.
P-31	P	How does AS solve the problem that harder than usual?
TAS-31	R	He is looking for the solution until he can either ask to friends who know or look for themselves.
P-34	P	If for example when solving a certain problem, does he have his own way?
TAS-34	R	Yes. Like a simple way, short.

P-47	P	Because yesterday when the discussion session also eee AS asked about "how about this way my because it is shorter" and I think it's a good way.
GAS-47	R	[*Laughs*] yes.
P-48	P	He is also a critical student in class, right.
GAS-48	R	Yes

b) Data Interpretation

As seen in the observation and the interview, it can be interpreted that AS uses critical thinking strategy well. This is caused by:

(1) AS often asks himself about the learning materials being read and the problem being solved.

(2) AS often makes the summary itself about the learning materials obtained from some references.

(3) To solve the difficult problems, AS tries to solve them by his own way and collects many references related to that problems.

(4) AS often solves the problems by his own way.

c) Conclusion

Based on obtained data, it can be concluded that AS uses critical thinking strategy well.

2) RG Subject

a) Data Display

RG often asks himself when solving the mathematics problems. This statement is corresponding to the interview transcript:

P-52	P	Okay then do you often ask yourself about the material which read or heard?
RG-52	R	Often.
P-53	P	Often? What is the usual question about yourself?
RG-53	R	Eee yah "*why can this be like*?" Yes like "*why this answer*?"

P-67	P	When noticed that he solving the or reading some references then did he look like talking-speak alone or like asking himself?
TRG-67	R	Always talking to himself. He doesn't want to be disturbed.

Besides that, RG often summarizes the learning material obtained from some references when those learning materials have differences. This aim is easier to understand the learning materials. This data is relevant to the following conversation:

P-55	P	Have you ever tried to conclude the reading material if there are differences in formulas or ... that are found from various sources?
RG-55	R	Eee if I conclude, ever.
P-56	P	For example eee why ... do you conclude the material?
RG-56	R	Because I think if I am using a more general formula, that is very important because that cases require more detailed analysis, it can not be used for other problems.

P-68	P	Has he ever summed up his own learned material?
TRG-68	R	Ever.

RG understands the problems first then looks for the data that needed and relates them to the problems when he faced the difficult problem. Even RG always thinks about the alternative way to solve the problems. When finding the different way, RG will correspond it to the general way used. RG often relates the new concept to the previous concept or conversely if needed to solve the problems too. The data reported above is relevant to the conversation below:

P-57	P	How do you solve the difficult mathematics problems?
RG-57	R	The way is understand what is in the material. Read what the problem wants and then collect the data. Relates data with what's requested.
P-58	P	So how do you relate that data?
RG-58	R	Relating that data ... see a relationship for example when we try to solve the proof problem. For example proving an equation. That is, we must relate that the right and the left should be the same. So how does the right and left sides have to be equal to seeing their relation to both sides. For example when we want to prove trigonometric equations. For example there is an equation and then the result is sec. So, we have to make sense of what the explanation is. For example sec is 1 / cos. It means that we try to make what is on the left is cos.
P-61	P	Furthermore, do you ever make or think of alternatives or other ways to solve a certain problem?
RG-61	R	Yes even eee when I get alternative solution, before I see alternative solutions sometimes I find my own answer and when match and true then I see that way. Because the way I do is different.
P-26	P	If for example at home is he used his time to solve Olympics problems?
KRG-26	R	How?
P-27	P	Olympic problems?
KRG-27	R	Oh Olympics, he always do that anyway.
P-70	P	If he has the difficult problems, how does he solve them? What did he do to get the answer?
TRG-70	R	Think for themselves. Ordinary he always look for his way to solve the problem.
P-71	P	Does he reread the books when it's so difficult?
TRG-71	R	Never. He tried to solve the problem without media or book
P-75	P	If for example he solves the problem, does he has his own way to finish it?
TRG-75	R	Yes, he has its own way.
P-76	P	That way, is it easier or how?
TRG-76	R	It's easier to think of.

P-25	P	If for example there is a problem, can he do it?
GRG-25	R	Yes he can.
P-26	P	Common in group discussions ...
GRG-26	R	Sometimes he gives me a problems of "Mrs ... what happen if there is something like this"
P-27	P	Ordinary if there another form problem, right?
GRG-27	R	Yes.

b) Data Interpretation

Based on the interview, it can beinterpreted that RG uses critical thinking strategy well. This is caused by:

1) RG often asks himself about the learning material read and the problem being solved.
2) RG often makes the summary about the learning materials obtained from some references.
3) To solve the difficult problems, RG tries to solve them by his own way by looks for and collects references related that problems.
4) RG often solves the problems by his own way (another alternative.

c) Conclusion

The result shows that that RG uses critical thinking strategy well.

2. Metacognitive Strategies Strategy

a. Planning

1) AS Subject

a) Data Display

See the following field note:

Strategi Metakognitif *(Metacognitive Strategies)*	1) *Planning* (Perencanaan)	1.1 Plan the activities to study new mathematics topics before the topic is studied 1.2 Before beginning to study mathematics, students think about what and how students will study 1.3 Before studying, students plan how much time it takes to learn a topic	*Before learning activities begin, AS reads textbooks. Researchers observe the time before study and at rest.*

The observation result provided that sometimes AS makes plan before learn. AS opened his books before class started. This is relevant to the conversation below:

P-112	P	Eee do you plan to study new mathematics material before the material is learned?
AS-112	R	Sometimes if not too busy. Suppose when in the morning, oh later ee later I will learn this because it's in my opinion the learning material is interesting and hard, so I better learn it first night. Keep going next time for this one. So..
P-66	P	If for example he wants to study, is there a plan?
KAS-66	R	Hm no, depending on his mood
P-67	P	Immediately learn?
KAS-67	R	Yes because there are many activities. Also join the organization. I also do not know how to manage his time.
P-33	P	How does he really study the material at home before getting into it?
TAS-33	R	Usually when it's morning, he says that he has learned it last night, so it is. And he was so good at learning mathematics that he definitely felt motivated.

P-22	P	Do you also know the things that ordinary AS do, both NM and AZ in learning mathematics?
GAS-22	R	Yes. Preparation is also common to find other reference books if no books are found.

AS sometimes think the best way to understand the certain topics. However, AS didn't plan how many time will be used to learn mathematics. In addition, AS has certain target will be achieved so that more motivate. This statements as shown in conversation below:

P-117	P	Amazing, physics.. [*laugh together*]. Okay, do you plan how much time will used to learn about mathematics material?
AS-117	R	No.
P-121	P	Have you ever thought of the best way to learn a topic?
AS-121	R	Ever. That's what we look for the concept, find a simple way or a quick trick. From reference too.
P-123	P	Do you target specific learning goals that can motivate you to learn on your own? Is there a target if you want to learn?
AS-123	R	Target? Ordinary.... like this I really want to learn because I will pass in OSK in my district.
P-139	P	Well have you ever determined yourself oh this one that i need to learn because this is what i need to know?
AS-139	R	If I but I specify, just different goal. I specify, for example really I do not understand so that I re-repeat ... learn. But, if that's what ... like already exists in the brain, so I put that aside first. If there is another time then I learn about it.
P-69	P	Hm does he sometimes plan the amount of time he spent to learning mathematics?
KAS-69	R	Not because sometimes he learns when he has prayed Isya until 10 o'clock or to sleep.
P-70	P	No ... he does not specify the time he would use?
KAS-70	R	No.

P-72	P	Have you ever asked what the purpose of learning is so ... he targets something so he learns diligently?
KAS-72	R	Oh yes. Since it started before entering high school I already told, if sma where is your destination, "SMA mana" he said "SMA 1". Then I said "then after ... after graduating from high school there must be a goal to college". He said "where is good", keep me saying "if that's good STAN". He said "oh yeah, nice there, what exactly is there?" I continue to reply "if there we must be smart math ... this is this". Indeed he targets there.
P-80	P	Hm indeed if at home is there a schedule of learning that he made?
KAS-80	R	Nothing, he learns when he will. If he wants to learn ... learn .... if not ... not really. Because every day he still in school. If he came home from school sometimes he stayed at school. So if he comes home at night. Night also sometimes he came out with his friend to work tasks. He keeps do the tasks.
P-35	P	as he ever told his stories that his learning goal so he has the spirit to learn? Is there anything he wants to accomplish?
TAS-35	R	Yes. There was indeed time he told me so, he wanted to boast of his parents by studying earnestly. His ideals to be a businessman if not wrong.

b) Data Interpretation

Data which obtained by the observation and the interview can be interpreted that AS didn't use planning strategy when learning mathematics. This is caused by:

(1) AS didn't have certain plan before learning because sometimes he is busy with his organization. However, he often learns that learning material before taught in the class.

(2) AS didn't think about what and how he will learn.

(3) AS has targets to be achieved that is want to pass OSK, makes his parents happy, study at desired place.

(4) AS didn't plan how many time will use in learning because adjusted with the learning material difficulties learned.

c) Conclusion

As shown in data above, it can be concluded that AS doesn't use planning strategy.

2) RG Subject

a) Data Display

See the following conversation:

P-66	P	Is there a plan?
RG-66	R	Eee not. I learn the mathematics according to my mood when I want.. eee when my curiosity increased then I read the book.
P-67	P	So, even though the material has not been learned?
RG-67	R	So and sometimes I have not studied at home but when in school my teacher read out and I immediately understand the material.

The conversation above provided that RG didn't plan his learning activities. RG learns as his mood. This is relevant to the following interview transcript:

P-20	P	If he wants to learn, does he often make plans? Is there a plan before learning?
KRG-20	R	No ... That's all because he has trained as childhood ... he has been taught since elementary school. Go back to school ... sleep ... wake up from sleep ... anyway it's afternoon or evening he has to learn.

Besides that, RG didn't think about what he will do when learning the material because RG directly takes a book, read it, and solves the problem. RG never manage how many times used to learn because adjusted to the learning materials difficulties. This data is relevant to the following conversation:

P-71	P	Before learning mathematics, do you think about what and how will you learn later?
RG-71	R	Eee not. Directly ... directly grab a book, sit, read, when it is saturated ... rest, drink further.
P-72	P	I think you will sleep [laughs]
RG-72	R	[Laughs] no..
P-73	P	Okay then do you plan the time will you take to learn a material?
RG-73	R	No.
P-74	P	Never planned?
RG-74	R	Yes. Never. Just keep going until it's enough.

P-76	P	Have you ever thought of the best way to understand a material learned?
RG-76	R	Eee I think the best way is given the theory and given a problem. A more complicated problem is not directly by using a theory that can get the solution. Then we use that theory to solve the problem.
P-77	P	If for example there ... have you ever experienced if for example the teacher gives a solution like this but it turns out you get way more easily. Have you ever been?
RG-77	R	Ever.

P-23	P	If for example he studied, how much did he spend his time?
KRG-23	R	Not necessarily, too, if he had enough, he stopped.

P-86	P	Has he ever planned the how much time that will he spent on learning certain material?
TRG-86	R	Mmm if in my opinion he provides the time before starting the learning material in school.
P-87	P	Does he sometimes think of the best way to solve the problem or how to understand the material?
TRG-87	R	Sure.

Although RG didn't make the planning before learning, RG still has the targets to be achieved so that he is more motivated to achieve them. The conversation below is relevant to the data above:

P-81	P	Do you target specific learning goals that can motivate yourself to study?
RG-81	R	Yes, my motivational learning goals after I studied, I can slove the problems related to the theories that have been studied.
P-82	P	Hmmmm so is there really a learning goal specified before?
RG-82	R	Hm yah like that for example I can solve this kind of problem.

P-24	P	Have you ever asked what is the purpose of studying so diligently?
KRG-24	R	No, I never asked. I just ask "what will I do" ... But "I ... I prefer" he said the lesson is mathematics
P-25	P	Hm yes, because once I asked him that he wanted to be a doctor.
KRG-25	R	Iye.

P-77	P	Has he ever told you about whether he has his own learning goals or is there a target he wants to achieve so he diligently learns?
TRG-77	R	The goal, he wanted to win OSN in the field of mathematics.

b) Data Interpretation

The result of the interview can be interpreted that RG didn't use planning strategy when learning mathematics. This is caused by:

(1) RG didn't have certain plan before learning. However, RG often learns the learning materials before those taught in the class.

(2) RG didn't think about what and how he will learn.

(3) RG has targets to be achieved, that are he wants to pass in OSK and pass in the department of medicine.

(4) RG didn't plan how many time will use to learn because time used adjusted to the learning material difficulties learned.

c) Conclusion

Based on data above, it can be concluded that RG didn't use planning strategy.

b. Monitoring

1) AS Subject

a) Data Display

See the following conversation:

P-140	P	Have you ever tested yourself to know the extent of material that is known?
AS-140	R	Yes I have... I do a problem
P-141	P	Hmm through ... for example what problems are commonly used to know its ability?
AS-141	R	Sometimes the problem of evaluation, questions ... OSK questions.
P-145	P	How do you check the understanding of what material is being or has been learned? In addition to the previous evaluation.
AS-145	R	Like if I had time to spare, I remembered the lesson. If the lesson I do not remember, then I do not master the material.
P-146	P	So, until now if anyone asks about class X material for example or junior high school material, do you remember?
AS-146	R	Still.
P-147	P	Aa do you monitor the whole process of learning that you do? Monitoring is like organizing, viewing ... monitors....
AS-147	R	Sometimes. Sometimes just passing by myself like certain circumstances when I want to learn ... learn. But, if that's when I'm lazy.

The conversation above provided that AS tests his understanding of the learning materials by solving the Olympics problems. AS often makes the own problem to be taught to his friends.

Furthermore, AS monitors his learning process himself. This data is relevant to the interview transcript below:

P-74	P	Have you ever seen him test himself to know the extent of the material he knows?
KAS-74	R	Well I do not know that problem. However, if there is a competition he followed, there he also measured himself saying "*ohh I need to learn this mash*". Because if there are competitions he follows, I ask "*how? Difficult?* ", He said " *okay* ".
P-36	P	Has AS tested himself to know to what extent is the material understanding?
TAS-36	R	Just like solving on a problem and when there are a test.
P-55	P	Has AS made a problem then he answered it himself?
TAS-55	R	Yes, he has.

b) Data Interpretation

Data which obtained by the interview can be interpreted that AS uses monitoring strategy well. This is caused by:

(1) AS often makes his own problems to be taught to his friends. Sure, he will solve them before.

(2) AS checks his understanding and tests himself about the learning materials learned by his contribution in mathematics competition, solves the problems, and when he passed the exam.

(3) AS monitors his own learning process.

c) Conclusion

Based on obtained data, it can be concluded that AS uses monitoring strategy when learning mathematics

2) RG Subject

a) Data Display

See the following interview transcript:

P-85	P	Have you ever tested yourself to know the extent of the material that is known?
RG-85	R	Yes I have. The way is for example to follow online contests. Now there is an open mathematics contest made by TOMI (Indonesian Mathematics Olympic Team), so I often try it per month.
P-91	P	Okay then how do you check your own understanding of the material learned?
RG-91	R	Eee ya with how to solve the problem. When I solve the problem and the answer is correct then I consider my understanding of the material was complete.
P-95	P	Do you monitor the entire learning process yourself?
RG-95	R	Eee yes.
P-190	P	Have you ever made a problem then do it yourself?
RG-190	R	No. I'm just looking for a similar problems.

The conversation presents that RG never makes his own problems because just looks for the similar problems. RG rarely decides what the best learning material will he learned because RG wants to learn to adjust his interesting to the learning materials. RG always tests himself by joining the online mathematics contest which conducted. Furthermore, to checks the students'understanding on the learning materials, RG always solves the problems related to the learning materials and monitors his learning process himself. This data is relevant to the following interview transcript:

P-26	P	If for example at home is he used his time to solve Olympics problems?
KRG-26	R	How?
P-27	P	Olympic problems?
KRG-27	R	Oh Olympics, he always do that anyway.
P-28	P	So, at home does he often solve the problem?
KRG-28	R	Yeah, anyway if he goes to the bookstore, sometimes see the guidebooks for the Olympics ... he buys. Yes ... it's normal to buy. Usually buy this ... in Jakarta anyway, order on line.

P-78	P	How can he test himself to know the extent of the material he understands?
TRG-78	R	I do not know too maybe by complete the problem.
P-79	P	Does he often solve the problem in outside of school hours?
TRG-79	R	Sometimes.

b) Data Interpretation

Based on the interview, it can be interpreted that RG uses monitoring strategy well. This is caused by:

(1) RG didn’t make his own problems, however, looks for the problem which has the same characteristics.

(2) RG checks his understanding and tests himself about the learning materials learned by joining the competition, solves the problems, and when he passes the exam.

(3) RG monitors his own learning process.

d) Conclusion

As seen in the data above, it can be concluded that RG uses monitoring strategy when learning mathematics.

c. Regulation

1) AS Subject

a) Data Display

See the conversation below:

P-94	P	Hm how do you solve mathematics problems maybe that more difficult?
AS-94	R	More difficult?
P-95	P	Hmm
AS-95	R	For more difficult problems, I first look for references related to them. I understand how to solve them. I tried.
P-96	P	Have you ever tried that difficult material by reread the previous material?
AS-96	R	I have tried but sometimes .. sometimes difficult to understand.

The conversation above provided that AS many references that which related to the problems if found the difficult problems. Even sometimes AS relearn about that learning materials. This is relevant to the following interview transcript:

P-78	P	If he is, how can he solve for example if there is a difficult problem?
KAS-78	R	If it is a difficult problem? I do not know maybe he gathered his book he had learned or not.
P-31	P	How does AS solve the problem that difficult than usual?
TAS-31	R	He is looking for the solution until he can either ask to friends who know or look for himself.

When AS feels confuse about the materials which learned, AS will looks for the references related to the learning materials. Even AS uses more time to learn the difficult learning materials. This is relevant to the conversation below:

P-149	P	If for example you didn't understand or confused with the material, what will you do?
AS-149	R	If I do not understand, I look first reference in the book. I see how. Sometimes because if we just waiting solution from the teacher, it's hard right. So, I'm looking for myself in the book or in ...
P-150	P	So, are you trying to relearn it to be understood?
AS-150	R	Yes.
P-151	P	Do you use more time to study a more difficult mathematics topic?
AS-151	R	Yes, I do.

P-76	P	Hmm, so if for example he was confused, did he relearn the material?
KAS-76	R	Yes, or search also his friend's book that is related to mathematics.
P-77	P	Usually if he wants to learn the material, is there a lot of time spent on more difficult material? How much time does he spend?
KAS-77	R	Yes. Until he understands all.
P-78	P	If he is, how can he solve for example if there is a difficult problem?
KAS-78	R	If it is a difficult problem? I do not know maybe he gathered his book he had learned or not.

P-37	P	Has he looked confused when studying?
TAS-37	R	Bewildered-confused serious [laughs]
P-38	P	If so confused what he did?
TAS-38	R	Drinking, out fresh air, domino [laughs]. If there is a teacher, stop for a while, then go on.
P-39	P	If studying the difficult material, is there a lot of time he uses? Like when studying with you?
TAS-39	R	Yeah, not bad.
P-40	P	If the material is difficult, whether does he study slowly? Do you guys often study groups?
TAS-40	R	Yes, but usually if the problem will still be gained how to solve it. Yes, studying in school, sometimes also in our teacher's house. But, for now it is rare. That is rarely learn together in our teacher's home. If we are always together, even almost every day.

b) Data Interpretation

The results of interpreted that AS uses regulation strategy when learning mathematics. This is caused by:

(1) When confused, AS looks for many related references and learns them.

(2) AS uses more time to understand and solves the difficult problems.

(3) If there are difficult problems then AS keep trying to solve them.

(4) AS often learns the learning materials before taught in the class so that AS understands them before continuing to the next learning material.

c) Conclusion

Based on obtained data, it can be concluded that AS uses regulation strategy when learning mathematics.

2) RG Subject

a) Data Display

If RG confused about the materials learned then RG will relearn until understand them. This statement is relevant to the following interview transcript:

P-98	P	If you are confused about the topic of the material have studied, how do you attempt to address it?

RG-98	R	Eee I am confused ... when I am confused with a topic that ... I am re-looking at the topic ... the title and eee title of the book then anything that will be understood. If I am still confused, sometimes I ask my teacher.
P-99	P	So, do you try again to relearn the material?
RG-99	R	Eee yah sometimes.

P-30	P	Have you ever seen him feel confused when learning mathematics?
KRG-30	R	No, I have not. never

P-80	P	Have you ever seen him confused when learning?
TRG-80	R	Often when studying physics. If in mathematics he rarely confused, but ever.
P-81	P	If felt confused, what effort he did to get rid of his confusion?
TRG-81	R	Nothing, he has to solve a problem that confuses him.

In addition, RG learns the difficult learning material slowly. If RG feels difficult to understands and solves the problem then RG will use another way so that RG always understands the learning material before continue to the next learning materials. This data is corresponding to the conversation below:

P-101	P	Do you spend more time when studying difficult mathematics materials?
RG-101	R	Eee yah I do.
P-102	P	Do you learn the material slowly to find out?
RG-102	R	Slowly because I have tried the technique of simultaneously studying many materials it eee as a result I just know the theory but I do not know the concept.

P-107	P	Okay then how do you solve the problems that are difficult to understand?
RG-107	R	Keep trying and praying. [*laugh*]
P-108	P	Suppose there are the difficult eee problem but because of that material for example in a material there is the first problem is done like this, the second problem may be rather difficult. Do you use the same way to solve this difficult problem?
RG-108	R	Unlike, we use different views to solve the problem.

P-110	P	If you have moved a new topic and for example there is still some material that you have not understood yet, how can you handle it?
RG-110	R	Normally I do not want to move the topic if I have not understood the material so it never happens that way.
P-111	P	For example in the class, teachers usually limits this material to several meetings.
RG-111	R	But, usually discussed thoroughly. So, indeed we already understand very well we just moved.
P-23	P	If for example he studied, how much did he spend his time?
KRG-23	R	Not necessarily, too, if he had enough, he stopped.
P-36	P	Hm so if ... does he use a long time when learning mathematics?
KRG-36	R	Yes.
P-83	P	Did he use the previous material to solve the problem?
TRG-83	R	Sometimes.
P-84	P	For example, if he solves the problem, did he use the material have been learned?
TRG-84	R	Sometimes too.
P-88	P	Does he use more time to learn difficult mathematics materials?
TRG-88	R	Yes, but only when he wants to follow mathematics competitions. If like school material as well as usual.
P-89	P	Did he study slowly for the difficult material?
TRG-89	R	Yes, because he must be more thorough.
P-91	P	If for example move to a new topic, is there the material that he has not understood?
TRG-91	R	No, he must have understood all before move to new material.

b) Data Interpretation

The data above interpreted that RG uses regulation strategy well. This is caused by:

(1) When confuse to understand the learning materials, RG will relearn that learning materials until understanding them.

(2) RG learns the difficult materials slowly and uses more time.

(3) If there are the difficult problems to be solved, RG keeps trying to solve them.

(4) RG often learns the materials before taught in the class such that RG understands them before move to the next learning material.

c) Conclusion

As shown in data above, it can be concluded that RG uses regulation strategy when learning mathematics.

3. Resource Management Strategies

a. Time Management and Study Environment

1) AS Subject

a) Data Display

See the following field note:

Strategi Pengelolaan Sumber *(Resource Management Strategies)*	1) Manajemen waktu dan lingkungan belajar (*time management and study environment*)	1.1 Students use time to learn effectively and efficiently 1.2 Students learn mathematics in places where they can concentrate 1.3 Students use the learning schedule when preparing for mathematics exams 1.4 Students learn mathematics at a time in which they can concentrate 1.5 Students attend classes regularly and on time	*AS is always in the class, sometimes AS takes a rest in the class.* *During the observation, AS never late to attend the class.*

The result of the observation above shows that AS never late in attending the learning process in the class. And sometimes AS uses break time to learn. The statements are relevant to the conversation below:

P-194	P	Do you always attend in the class regularly and on time?
AS-194	R	What is a class?
P-195	P	Class in the class ... especially if learning mathematics.
AS-195	R	Ooo I rarely leave the class ... I stay in the class ... if there is business like organization problem well ... surely mostly out of class than in class ... if I have spare time. If there is no teacher, I go to the organization. Especially I'm in the scout there is an exam. So that's what I care about.

P-81	P	Hmm have he ever been late to school?
KAS-81	R	No, he is the most diligent person to school.
P-82	P	Early in the morning?
KAS-82	R	Yes, very early in the morning.

P-52	P	But, if for example he studies in the class, is AS always focused when you teach?
GAS-52	R	Yes if it coincides with mathematics, he permits for organizational activities. However, it is rare because if the organization activities is in another free day.

AS isn't always uses the learning time effectively and efficiently. Even, AS didn't have regular learning schedule at home. When AS at home, he dominant learns mathematics and he learns another task. AS usually learns at night (9 PM) and early morning and AS didn't have the specific place to learn. This is relevant to the conversation below:

P-166	P	Do you use learning time effectively and efficiently?
AS-166	R	Ordinary ... sometimes efficient sometimes not.
P-167	P	Not in what time?
AS-167	R	Lazy.
P-168	P	Lazy? Ahh lazy right [*laugh*] so, do you have learning schedule?
AS-168	R	Schedule? Most schedule of studying the night, because if like this if in regular school until the magrib then arrived at home. I have many organizational activities.

P-169	P	So, at home do you learn regularly? For example this time I learned this, this time I learned this.
AS-169	R	No. Irregular , it's also important ... that's when I'm at home dominant learn mathematics.
P-170	P	Yes, does that mean whether iis it regular at home?
AS-170	R	Sometimes regular sometimes not.
P-171	P	Hmm if at home that schedule of learning around what hours?
AS-171	R	9 PM.
P-180	P	Do you have a specific place to study? For example there are certain places you can concentrate to learn? Where place in the school?
AS-180	R	If… there is no in the school. At least if ... if not mood for joking, I open my book. But, if mood I joked until the time was spent because of joking alone.
P-189	P	Do you specify a certain time to learn mathematics such as eee in these hours that I am more easily concentrated to learn? So I use that time to learn mathematics.
AS-189	R	I don't have specific time ... like come home from school if there is no work and I fell I want to learn about an interesting material I remembered so I opened my book.
P-80	P	Hm indeed if at home is there a schedule of learning that he made?
KAS-80	R	Nothing, he learns when he will. If he wants to learn ... learn .... if not ... not really. Because every day he still in school. If he came home from school sometimes he stayed at school. So if he comes home at night. Night also sometimes he came out with his friend to work tasks. He keeps do the tasks.
P-84	P	Hm is he just studying in the room? Is there no other place?
KAS-84	R	Yes, that's in front of his book. That's all his friends at home. Or if for example he bored .. sometimes he watch TV.
P-86	P	Hm if for example ... if for example he wants take an exam ... does he schedule his time to study at home?
KAS-86	R	Yes, if he wants take an exam .. yes he always learning.
P-87	P	Hm is he focused for his exam?

KAS-87	R	Yes.
P-88	P	But, his time when he wanted to learn, what time is it? Is there a time?
KAS-88	R	Ordinary it's night. Like if he wants take an exam, come home from school ... if for example he back to home earlv..
P-42	P	Does AS use learning time well, effectively and efficiently?
TAS-42	R	Yes, sometimes also perforated like he did not do his night task, but the next morning.
P-43	P	Have you ever seen him have a learning schedule?
TAS-43	R	I do not know.
P-44	P	If he has spare time, is he always learning?
TAS-44	R	Yes, sometimes learn, sometimes also hang out with us.
P-45	P	If you usually see him, is there indeed a certain place?
TAS-45	R	At school?
P-46	P	Yes, for example there.
TAS-46	R	threre is no place in the school, everywhere. But, most often in his seat.
P-47	P	If he wants take an exam, especially mathematics is there a learning schedule? Such as group learning schedule also entered.
TAS-47	R	Appropriate with his mood. Sometimes not learning like the others.

b) Data Interpretation

Data which obtained by the observation and the interview interpreted that AS didn't use time management and study environment strategy. This is caused by:

(1) AS didn't use learning time effectively and efficiently because sometimes AS uses part of time to take a rest, play with his friends, and sometimes he is busy with his organization.

(2) AS didn't have a certain place to learn. However, if he is at home, AS always learns in his room.

(3) AS didn't have learning schedule to prepare mathematics exam because he has understood the learning material, even he only prepares for another subject.

(4) AS usually learns at night (9 PM and in the early morning).

(5) AS attends in the class on time and regularly.

c) Conclusion

As shown in the data above, it can be concluded that AS doesn't use time management and study environment strategy when learning mathematics.

2) RG Subject

a) Data Display

See the following interview transcript:

P-113	P	Okay then do you use learning time effectively and efficiently?
RG-113	R	Eee yes. You see, efficient learning is very important. Even within 15 minutes we can master the material 1 chapter. The point is to focus on the issues to be learned.
P-116	P	Do you use your free time to learn?
RG-116	R	Eee 60% ,.
P-117	P	60%?
RG-117	R	40% is used for rest. Because of school activities and so on.
P-119	P	If at home, do you have free time to study?
RG-119	R	If for now it is not too much. Only 50%.
P-120	P	Why can?
RG-120	R	Due to a lot of activities, for group work then.. we make materials and I also have additional activities. I am trying to write a book. A mathematics book ... but for junior high.

The result of the interview provided that RG uses learning time effectively and efficiently. RG uses several his free time to take a rest and does another activity (makes a book). This is relevant to the following interview transcript:

P-43	P	If he has free time, is he used to study?
KRG-43	R	Yes, sometimes in holiday… he fell bored because he didn't learn then he opened his book at that time.
P-95	P	If there is spare time in school, is he used to study?
TRG-95	R	Sometimes, but sometimes he used to rest or refreshing.

In addition, RG didn't have a certain place to learn when he is at home, even at school. RG didn't use learning schedule when prepares the exam because RG uses the learning material which understood at school to solve the exam problems. The statements are relevant to the conversation below:

P-121	P	Do you have a specific place to study?
RG-121	R	Eee usually just at home.
P-122	P	If for example in school, is there a certain place in order to concentrate?
RG-122	R	Ahhhaa no.
P-123	P	No?
RG-123	R	Anyway.
P-124	P	What about at home?
RG-124	R	Whatever, which is obviously comfortable to dock.
P-125	P	Where is it when at home?
RG-125	R	On the sofa [laugh]
P-126	P	On the sofa? After that, will you sleep?
RG-126	R	[Laugh] Yes, sometimes.
P-127	P	Do you set learning schedule to study before mathematics exams?
RG-127	R	No, I don't.

P-129	P	Never? So, what time you learn if for example next week will take an exam?
RG-129	R	Never. So, what I get at school during learning process ... that's what I use for the exam.
P-44	P	Hm yes, so, does RG have a certain place if he want to learn?
KRG-44	R	No, only in the living room, sometimes while watching.
P-45	P	So, can he learn anywhere?
KRG-45	R	Yes. He is not affected by other voices.
P-46	P	Oh yeah, so if for example he wants to take an exam, does he make a learning schedule?
KRG-46	R	Not really. Anyway if he wants to take the semester well as usual, everyday.
P-96	P	Is there a certain place for him in school if studying?
TRG-96	R	Nothing, most only in class.
P-19	P	For example what do students usually do if they want to take an exam? Did they have a goup when learning or what?
GRG-19	R	Before the exam eee if... after teaching ... I give the example of the problem. After that I give task for each students. If the task, for each students. There is a time that 1 person eee tell us about their answer ... all ... all represent their answer.
P-20	P	So, the point is whether it has been boosted in the classroom?
GRG-20	R	Yeah, before take an exam they have gone up one by one.

At home, RG often learns at night at 9 PM until 1 AM. Although, RG never late to attend the class. This is relevant to the following conversation:

P-130	P	Do you set a certain time to learn mathematics? The time when you can concentrate?
RG-130	R	Normally.. actually nothing but it depends on my mood ... i always in the mood to learn material at night. Around midnight at 9 PM. I always learn at that hour because in that time, my home is quiet. There are no activity, so it's nice.

P-132	P	Are you always attend in class regularly and on time?
RG-132	R	Attend?
P-133	P	In the class...
RG-133	R	Ohh yeah.
P-134	P	Is it never too late?
RG-134	R	Eee never.
P-48	P	Does he have certain time to study?
KRG-48	R	That I say, every 7 PM sometimes he learns ... he begin.
P-49	P	The important thing is, the time is after rest ...
KRG-49	R	Well after rest ... eat ... he began to open his book.
P-99	P	Is he never late to study in class?
TRG-99	R	Never, but even then if there is a call, if from the toilet, and another.

The conversation above is relevant to the following field note:

Strategi Pengelolaan Sumber *(Resource Management Strategies)*	1) Manajemen waktu dan lingkungan belajar *(time*	1.1 Students use their learn effectively and efficiently 1.2 Students learn mathematics in places where they can concentrate 1.3 Students use the learning schedule when preparing for mathemataics exams	*RG never late to attend in the class during observation.*

b) Data Interpretation

Based on the observation and the interview, it can be interpreted that RG uses time management and study environment strategy. This is caused by:

(1) RG uses his learning time effectively and efficiently.

(2) RG can learn everywhere, at school or at home, RG didn't have a certain place to learn.

(3) RG didn't use learning schedule before the exam because RG uses his the learning material's understanding to solve the exam problems.

(4) RG usually learns at night, at 7 PM until 1 AM.

(5) RG always attends the class regularly and on time.

c) Conclusion

As seen in the data above, it can be concluded that RG uses time management and study environment strategy when learning mathematics.

b. Peer learning

1) AS Subject

a) Data Display

The result of the observation shows that AS explain the way to solve the problem to his group and AS active to discuss with his group. This statement is relevant to the following conversation:

P-148	P	Hmm if ... for example if there are friends who are confused with mathematics materials learned, what is your effort to address it?
AS-148	R	Confused? I asked them which parts they confused. Let me give them a little explanation. If for example they do not understand eee I try again with others explaination. The important thing ... which is important if they do not know ... I return them to the teacher.
P-202	P	How do you explain to your friend that if there is a friend who did not understand the material?
AS-202	R	At first I asked which part he did not know. After that ... if they want to know faster way, this is like this. Especially if like this ... this I can not memorize this formula ... I tell them that this is not memorized. Understand this from this.
P-91	P	Have you ever seen him explain material to his friends before?
KAS-91	R	No, most if he explain to my cousin if there is a duty. Most he explain to him.

P-48	P	Has he ever explained the material to you or to any other friend?
TAS-48	R	Yes.
P-12	P	Does AS include active student in his class?
GAS-12	R	Yes, he is an active student. Then often learn together in group with other friends.
P-13	P	Activeness was observed Sir ... how to observe his activeness in class?
GAS-13	R	Activeness…because every class I make a group eee and AS is usually provide guidance to his friends.

Besides that, AS didn't have a group when learning mathematics. However, in other subjects, like chemistry, AS joins in a group to prepare quiz which always given from his teacher. Sometimes AS does the task with his friends. This is supported by the following conversation:

P-209	P	Do you have a study group on mathematics?
AS-209	R	No, I don't.
P-210	P	Why do not you have a study group?
AS-210	R	I have planned but ...
P-211	P	I mean when these classes may be you have certain people that you want to learn with..
AS-211	R	Sometimes there are.. sometimes not. If in Chemistry, there is a group during the learning process, because if Mrs. BN teach us, she directly tell us "okay student, you have to learn at home, tomorrow I want to see how the result" because if Mrs BN wants to enter in our class "hmm try this serial number ... explain this". So, if she will teach us, we have to learn how this way ... what about this… So, there's this group right here ... this group. Directly like there are groups.
P-90	P	Good Hm *Alhamdulillah*. If for example .. has he ever worked in a group if at home?
KAS-90	R	No, but sometimes his friend come home to study.
P-96	P	Hmm his teacher's home ... Mr. BS I think. Is there a study group if he wants to learn?
KAS-96	R	Study group ... I do not know also about that but he often go to his friend's home to study together.

P-98	P	Hm does he have study group?
KAS-98	R	No, because he doesn't want to be disturbed and keep calm at home. Mostly if I ask him then he explained, if not ... no. He doesn't want to give a headache.
P-50	P	Does AS usually work with friends to complete his task?
TAS-50	R	Always.

b) Data Interpretation

Data which obtained by the observation and the interview interpreted that AS uses peer learning strategy when learning mathematics. This is caused by:

(1) AS often explain the learning materials to his friends.

(2) AS often collaborates with his group to solve the tasks.

(3) AS often spares his time to discuss with another group to help them solve the problem or understand the certain subject.

c) Conclusion

The results concluded that AS uses peer learning strategy when learning mathematics.

2) RG Subject

a) Data Display

See the following field note:

2) Tutor sebaya (*peer learning*)	2.1 Students try to explain the material learned to their or other friends 2.2 Students try to work with other students in the classroom to complete the task	*RG explained the materials and problem solving to his group's friends.*

The result of the observation provided that RG explains the way to solve the problems to his group. This statement is relevant to the conversation below:

P-135	P	Have you ever explained the material which learned to your friends?
RG-135	R	Often.
P-136	P	Often?
RG-136	R	Yes.
P-137	P	So, is there a friend that always asking how is this?
RG-137	R	Eee yes, and not just mathematics material but there are other fields like chemistry, physics. But it is related to the exact of all.

P-32	P	Oohh so, does he like being a teacher?
KRG-32	R	Yes, sometimes his friends have a task, he is helping them.
P-33	P	Is he able to explain to his friend?
KRG-33	R	Yes, he is. You may not believe that once there was a friend came 20 people at home to study.

P-100	P	Can he explain the material to his friend?
TRG-100	R	Ordinary, but just friend who ask him. But sometimes also do not ask but who have not understood the material.

P-9	P	How does he shows his activeness while studying in class?
GRG-9	R	Sometimes if how well ... right if in class ... not only me who teaches. Sometimes peer tutors. He is more than any other. He can make his friends understand. The way to explain eee to his friend is good.

Besides that, RG is able to finish his tasks himself so that RG rarely discuss to a certain group. However, when there is task in a group, RG can collaborate and active to finish them. This statement is corresponding to the following conversation:

P-140	P	Have you ever worked with your friends to complete the task?
RG-140	R	If the task is yes because my teacher gave the requirement that the task is not finished by all members of the group then there will be no value. So, eee each person should have a writing on the task.
P-141	P	So, working in the group?
RG-141	R	Yes.
P-147	P	Have you ever discussed with a particular group to solve the problem or understand the material?
RG-147	R	No, I haven't.
P-148	P	For example, in the class of "here in this group discuss about this…this group ... discuss this". Are you discussing with other groups?
RG-148	R	Eee I'm not.
P-31	P	Hm so, is he sometimes work in a group with his friends?
KRG-31	R	No longer group work. His friends from another class too ... came to learn mathematics with him.
P-101	P	Has he worked with his friends to complete the tasks?
TRG-101	R	I think he hasn't, maybe he will divide the task to his member of the group.
P-102	P	Does he have a study group?
TRG-102	R	There are those who want to learn at his home, he would learn with friends gladly.
P-103	P	For example, in a study group, does his group discuss with other groups?
TRG-103	R	The usual thing for RG if learning in a group.
P-11	P	Does he do his task independently? Always standalone when you give him the task?
GRG-11	R	Eee no. Group. Sometimes independent ... sometimes groups.
P-12	P	Indeed if for example only for his task is he works it alone?
GRG-12	R	If he is independent, he works alone ... if the group that his friends can not …he teaches ... if I see anyway.

b) Data Interpretation

Data which obtained by the observation and the interview

interpreted that RG uses peer learning strategy when learning mathematics. This is caused by:

(1) RG often explains the learning materials to his friends.

(2) RG often collaborates with his group to solve the tasks.

(3) RG's group rarely discusses with another group when discussion.

c) Conclusion

As seen in the data above, it can be concluded that RG uses peer learning strategy when learning mathematics.

c. Help seeking

1) AS Subject

a) Data Display

See the following field note:

3) Mencari bantuan (*help seeking*)	3.1 If students do not understand a topic, they ask the teacher 3.2 If students do not understand a topic, they ask his friends 3.3 If students do not understand a problem, they ask other students about their answers which needed to complete the task	*During the observation, AS occasionally asked the teacher* *AS discussed with his group to complete the assignment.*

The result of the observation provided that sometimes AS asks his teacher. Besides that, AS discusses with his group to solve the task given. This statement is relevant to the following interview transcript:

P-215	P	Have you asked for help to the teacher if you do not understand about a topic?
AS-215	R	Always.

P-99	P	[*Laughs*] If for example there is material that he does not understand, has he ever asked others at home?
KAS-99	R	No. Learn on his own way. That is, he is looking for his own solution how to solve. Maybe if it can not be solved, he bring it to school.
P-100	P	Just asked the teacher?
KAS-100	R	Yes.

P-50	P	Does AS usually work with friends to complete his task?
TAS-50	R	Always.

P-54	P	Has he ever asked for help to the teacher if there is something he does not understand?
TAS-54	R	Yes He has.

P-31	P	Especially when studying in class, does he often ask you Sir?
GAS-31	R	Yes. He often ask me in the class.

In another hand, AS has asked his friends to solve the task especially if his friends have a complete references. This is relevant to the conversation below:

P-220	P	Have you ever asked for help to a friend if you do not understand the material?
AS-220	R	Never, sometimes my friends have reference that I do not have at all. It's a different book. Maybe he's a fuller book or how, I asked all that.
P-221	P	For example, if you solve the problem turned and your friend's answer more complete, better. Have you ever tried asking about it?
AS-221	R	Yes. For example if I hesitate my answer I ask my friend what do like this… depending on the reference.

P-52	P	Does AS work alone independently? I mean even though not cooperating with friends?
TAS-52	R	Yes he does.
P-53	P	Has he discussed with his friend if anything is poorly understood?
TAS-53	R	With us [*laughs*]

b) Data Interpretation

Based on the observation and the interview, it can be interpreted that AS uses help seeking strategy when learning mathematics. This is caused by:

(1) AS often asks his teacher if there are the learning materials which not really understand, especially for his preparation to join the mathematics competitions.

(2) AS has asked his friend to help him understand the certain learning materials because his friends have a complete references.

(3) AS often looks for the references if there are the learning materials which not really understood.

c) Conclusion

The results concluded that AS uses help seeking strategy when learning mathematics.

2) RG Subject

a) Data Display

See the following interview transcript:

P-98	P	If you are confused about the topic of the material have studied, how do you attempt to address it?
RG-98	R	Eee I am confused ... when I am confused with a topic that ... I am re-looking at the topic ... the title and eee title of the book then anything that will be understood. If I am still confused, sometimes I ask my teacher.
P-149	P	Okay then have you ever asked for help to your teacher if you do not understand the material?
RG-149	R	Yes I have.

Based on the interview, it can be provided that RG asks his teacher if there are the learning materials that not really understood. This is relevant to the following conversation:

P-56	P	Is he asked someone if there is something he don't understand?
KRG-56	R	Yes. Sometimes he asks his teacher ... there was once a teacher, a mathematics teacher ... at junior high school, he asks his teacher because he already solve the question ... but his teacher can not yet.
P-25	P	Does he often ask his teacher when his teacher explains?
TRG-25	R	Yes. He's the most active person in the class.
P-26	P	Overactive.
TRG-26	R	Yes.
P-24	P	Does he often ask you in class?
GRG-24	R	Hm often [*laugh*] very often.

Although AS often ask his teacher about the learning materials, RG never asks his friends if there are the learning materials which not really understood, and there are the tasks which given by the teacher. This is corresponding to the following conversation:

P-162	P	So, then do you ever ask for help to anyone ... in order to understand well the material which learned?
RG-162	R	No.
P-163	P	No?
RG-163	R	To my cousin? To whom was the question?
P-164	P	To anyone...
RG-164	R	Anyone? If anyone ... if the teacher ever ... if anyone…not.
P-58	P	Has he asked anyone at home or if there was something he does not know?
KRG-58	R	Hmm if RG's cousin has something he does not know when learning mathematics, he asks RG.

P-59	P	Has he asked anyone at home or if there was something he does not know?
KRG-59	R	Hmm if his cousin has something he does not know when learning mathematics, he asks RG.

P-105	P	Has he ever asked his friend if there is something he does not understand?
TRG-105	R	In my opinion, never.
P-106	P	Does he usually ask his friend if there is an unfinished task?
TRG-106	R	Never.
P-107	P	Does he ask for help if there is material that he has not understood?
TRG-107	R	Never, his name is RG, he has to fend for himself without asking for help from others [*laugh*]

b) Data Interpretation

The result of the interview interpreted that RG uses help seeking strategy. This is caused by:

(1) RG often asks his teacher if there are the learning materials which not really understood, especially another subject except mathematics although RG never asks his friends to understand the learning materials or solve the problems.

d) Conclusion

As seen in the data above, it can be concluded that RG uses help seeking strategy when learning mathematics.

The summary of the data above can be seen in the following table:

Tabel 4.3 Indicator of Learning Strategies that have been used by High Achiever Students

Dimension	Indicator	Subject AS	Subject RG
Cognitive Strategies	1. *Rehearsal* (Pengulangan)	-	-
	2. *Organizing* (Pengaturan)	-	-
	3. *Elaboration* (Elaborasi)	√	√
	4. Critical Thinking (Berpikir kritis)	√	√
Metacognitive Strategies	5. *Planning* (Perencanaan)	-	-
	6. *Monitoring*	√	√
	7. Regulation (Pengendalian)	√	√
Resource Management Strategies	8. *Time management and study environment* (Manajemen waktu dan lingkungan belajar)	-	√
	9. *Peer learning* (Tutor sebaya)	√	√
	10. *Help seeking* (Mencari bantuan)	√	√

B. Discussion

Data which obtained by interview shows that both research subjects have almost the same learning strategies. Both research subject like mathematics as a child and they always join mathematics competition although sometimes they only learn when they want (mood).

This show that education and supervision from their parents as a child very influences their child motivation for learn and excel in education. Except for motivation, other factors do not directly influence student learning achievement. That factors then form someone has the different learning strategies.

AS and RG didn't use rehearsal strategy when learning mathematics. AS and RG rarely notes in the class because they always focus when the teacher is explaining. AS and RG often solves the problems when during the learning process. Other than that AS and RG usually learns the next learning material when the learning material is taught in the class because that learning material had learned. AS and RG understand the formulas and definitions taught such that they always remember without seems like memorizing.

About organizing strategy, AS and RG didn't use it well. This is caused that AS and RG rarely makes the learning material points and sign the learning material being learned. They only remember the learning material and focus when learning. AS and RG didn't make the list of formulas or certain definitions in mathematics. This caused they have understood well that formulas and definitions when taught such that they always remember them.

Elaboration strategy is used by AS and RG when learning mathematics. AS and RG capable of integrating the learning materials which they have learned to solve the problems. AS and RG easily to understand the learning material being learned because they use their own way to understand the learning materials based on their mind pattern. They have many references when learning such that their understanding don't limit on the learning material taught in the class. They use too many references about the mathematics Olympic problem.

Critical thinking strategy is used by AS and RG when learning mathematics. Both of them have the high curiosity when finding the difficult problem, for example, Olympic problems. AS and RG always try to solve the

problem by the various way. Even, they often make an alternative solution by their own way. AS and RG use many references to find the theories needed to solve the problems. Even, relates some the learning material concepts they have learned.

Related planning strategy, AS and RG didn't use it when learning mathematics. AS and RG target the learning aims which they will achieve without a plan in detail what will they do. AS and RG learn to depend on their mood and according to the difficulty of the learning material will learn. Other than that AS and RG always learn the learning material before that learning material taught in the class.

AS and RG use monitoring strategy when learning mathematics. They always monitor their learning process. AS is a silent one at home and manages all the thing he needs himself and everything he does at home. Likewise, RG as a child accustoms learn after taking a rest, monitor his learning process. AS and RG always solve the problems to test his understanding about the learning materials taught.

The next strategy is regulation strategy. This strategy is used by AS and RG when learning mathematics. If AS and RG feel confused about the learning material of the problem being learned then AS and RG try to understand it. The use many references in learning even learn the learning material slowly until they understand them well.

Related time management and study environment strategy, AS didn't do it when learning mathematics. AS has organization activities which sometimes coincide with his learning time. Furthermore, AS don't do

preparation before the mathematics test. AS uses the learning time to learn about another subject learning material. This strategy is used by RG when learning mathematics. RG rarely join organization activities such that his free time almost used to learn. Furthermore, RG always attends in the class regularly and on time. They tend to learn in certain place and time.

AS and RG use peer learning strategy when learning mathematics. AS and RG always explain the learning material to their friend which not really understand the learning material learned. AS and RG capable of working in a group to solve the problem given by their teacher. AS and RG often discuss in the group to help their friend to understand the learning material being learned.

The next strategy is help seeking strategy. AS uses that strategy when learning mathematics. AS often asks his teacher when there is the learning material which not really understood. Sometimes AS ask for help to his friend to help him in learning. Sometimes his busy in the organization and another activity which makes AS have no time to finish his task and ask his friends.

In contrast to AS, RG only asks his teacher when there is the learning material which not really understood, however, he never asks his friend and other people. RG always finish his task independently. If there is the learning material which not really understood, RG tries to learn it. Asks his teacher is the latest way that RG did when there is the learning material which not really understand.

CHAPTER V

CONCLUSION

A. Addressing Research Question

The research results show that the researcher obtains the following findings of learning strategies in mathematics of high achiever student:

1. Rehearsal Strategy

   Rehearsal strategy is not used well by high achiever student in mathematics in this case. They rarely notes the learning material taught, includes the formulas and mathematics definitions. AS and RG feel unnecessary to use this strategy because they have understood the learning material which taught well and always remember that learning material. AS and RG understand the formula so easily to remembered without memorizing. Likewise when solving the problems, AS and RG only solves them once.

2. Organizing Strategy

   Organizing strategy is not used well by high achiever students. They rarely make the learning material point which taught or sign that learning material. Even AS and RG didn't make the list of certain formulas or mathematics definitions to help them in learning. When learning, they focus and understand that formula such that AS and RG didn't need the certain table or list.

3. Elaboration Strategy

High achiever students in mathematics use elaboration strategy when learning. They use the learning materials being learned to solve the problems especially Olympic problems. AS and RG often use their own way to solve the certain problem even use their own words that easier to understand the learning material.

Although AS and RG rarely make the summary, the still understand and remember that learning materials because they always focus when learning. AS and RG use many references when learning and capable of relating the important points from the learning materials they have learned. Even they use that learning materials to solve the certain problem when discussion in the class.

4. Critical Thinking Strategy

High achiever students in mathematics always use critical thinking strategy when learning. They always ask himself when learning. When using many references, they always try to conclude that learning material if there are some difference found. AS and RG try to solve the difficult problems by using the learning materials they have learned. Even they often learn the learning material which not taught at school to help them solve the Olympic problems. They capable of relating several concepts being learned to solve a certain problem. Even AS and RG always thinks another alternative when solving the problems.

5. Planning Strategy

Planning strategy is not used by high achiever students in this case. They have no learning schedule structured. AS and RG learning by their need (mood). AS and RG didn't think about what will they do to learn the learning materials and didn't decide how many time they need to learn that learning materials. They accustom to learn until they really understand the learning material. However, they still have learning target that will be achieved.

6. Monitoring Strategy

High achiever students in mathematics always monitoring their learning activities. They decide what will they learn and test themselves about their understanding about the learning materials. To test the understanding of the learning material, AS and RG always solve the problems relates the learning material and solve the Olympics' problems.

7. Regulation Strategy

Regulation strategy is used by high achiever students in mathematics. They can manage everything they need and everything will they do themselves. When AS and RG confuse about the learning material being learned, they will open many references and try to understand. AS and RG learn the difficult learning material slowly. They use several ways to solve the difficult problems.

8. Time Management and Study Environment Strategy

Time management and study environment strategy are not used by AS when learning. AS didn't use learning time effectively and efficiently because sometimes he follows his organization activity. Sometimes before the exam, AS uses his time to learn about another subject.

In another side, RG always uses his learning time effectively and efficiently. RG rarely follows organization activity and always attends in the class regularly and on time. Although AS and RG didn't make the learning schedule before the exam, they still understand about the learning material will be tested because they understand them when learning. They tend to learn at certain place and time.

9. Peer Learning Strategy

High achiever students in mathematics use peer learning strategy when learning mathematics. They always explain the learning material to their friends who didn't understand the learning material. They capable to work in a group to solve their task which given and often discusses in the class to discuss the certain learning material.

10. Help Seeking Strategy

Help seeking strategy is rarely used by high achiever students in mathematics, for example, RG. RG only asks his teacher when there is the learning material which difficult to understand. RG never asks his friends if he feels difficult when learning. RG solve the problems independently. Even RG only asks his teacher if really difficult to understand the certain

learning material. In another side, AS, besides ask his teacher, sometimes AS asks his friends too if there is a task or the learning material which difficult not really understood. Moreover, he always follows the organization activity which causes he asks his friends to complete school task.

B. Research Limitations

1. Research subject which used only two persons at SMA Negeri 1 Bone such that the research result can't be generalized to object outside this research. Research result may different to every high achiever students and the school where they come from.
2. Data in this research based on interviewees' perception such that they are free from subjectivity. Data obtained by interview may different with real condition. Therefore, research result can't be generalized to all students.
3. Data obtained by interview the family, the classmates, and the teachers may incompatible to learning strategies of the subjects because they don't always see the learning activities of the subjects directly.

C. Recommendations

The researcher would recommend the following:

1. The students are expected to understand about their learning strategies so that they can decide their learning strategies effectively to enhance their achievement.
2. The family is expected to help the students in deciding their learning strategies which can be used based on their academic's ability.

3. The school should intensify tutoring for the students who will take the competitions at Olympic level.
4. To the next researcher, they can be researched about the relation between learning strategies and other variables for all education's levels.

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